WaterSMART Grant: Water and Energy Efficiency Grants for Fiscal Year 2023
Category A Application 7/28/2022

BWD Project Lining of Mohave Canal (0.5/1.5 Mile Section)

A COLLABORATIVE PROJECT BETWEEN

BARD WATER DISTRICT

AND

BUREAU OF RECLAMATION

Submitted by:

Nick Bahr
General Manager
Bard Water District
1473 Ross Road
Winterhaven, CA 92283
(760) 356-0714
Bardwater@outlook.com

R23AS00008

Table of Contents **Page**

1. Technical Proposal and Evaluation Criteria

1.1 Executive Summary

Two Year Project
If NTP by 03/31/23
03/31/23 – 03/31/25

This application is being submitted on July 28, 2022,
By: Bard Water District (BWD), Winterhaven, Imperial County, California

The Bard Water District (BWD) in Winterhaven, California, is located along the lower Colorado River and borders Arizona (Yuma) and Mexico (Algodones). BWD along with the Quechan Indian Tribe request funding under Category A to complete **Project 4: Lining the second 0.5-mile section of the upper Mohave Canal with concrete to improve the existing water conveyance and delivery infrastructure.** The Mohave Canal (total 2.78 miles) project has completed 2 phases of the 5-step project; Phase 3 was recently selected for award and is projected to be completed during summer 2023. This project is listed as a Priority 1 in the USBR Reservation System Evaluation Technical Memorandum No. USBR 35-RDE-8150-STY-2016-02 conducted in January 2017, complies with our approved 2020 Five-Year Water Conservation Plan as well as our 10-year Capital Improvement Plan. A HAER was also completed in June 2021 for Environmental Compliance.

In August 2021, Project 1: 2019 AWE Grant: Concrete Lining of the lower tail (1.28 miles or 46% of the length) of the Mohave Canal was completed. Seasonal fallowing enabled us to complete this long section of canal lining.
In October 2021, Project 2: WCFSP Grant Application was awarded for Engineering and Design of the remaining 1.5-mile section.
In May 2022, Project 3: WEEG was selected for award to complete the first 0.5-mile section of the remaining 1.5-mile section of the Mohave Canal.

We will accomplish the goals established for the WaterSMART Water and Energy Efficiency program by implementing activities that will **increase water supply savings and reliability** by lining another 0.5 miles of earthen Mohave Canal and replacing or rebuilding required appurtenances, thus, **conserving water. This Project 4** in addition to projects 1-3 will **control water loss, reduce seepage and transpiration, prevent upstream flooding/erosion, provide faster and more consistent, reliable, and efficient flow/delivery down-stream and prevent over-topping of the turnout gates and laterals and the dirt banks to reduce water needed and prevent catastrophic crop damage from unscheduled flooding.** The concrete lining of the entire Mohave Canal would conserve approximately 1,940 acre-feet/year. In addition, the amount of water required/delivered would be reduced by being able to safely increase flow rate.

Subsequently, 23.4% or 1 acre-ft/per 4.27 acre-ft of water or 1.2 acre-ft of water/per 1 acre of land would no longer be lost from seepage/transpiration.

BWD is located on a Federal **USBR** facility and is a Reclamation project (Yuma Project, 1909). It receives water from the Colorado River via the All-American Canal.

1.2 Project Location

The Mohave Canal is an approximately 2.78-mile-long earthen canal and was built between 1909-1910 as part of the Yuma Project; 1.78 miles of the canal has been concrete lined; 0.5 miles has been selected for award and is scheduled to complete summer 2023. The Yuma project, initiated in 1909, was one of the earliest irrigation construction projects authorized by the newly created United States Reclamation Service. The Mohave Canal is in the city of Winterhaven, Imperial County, California. It begins at the bifurcation of Reservation Main Canal at Leathers Road and proceeds South running west of the Colorado River to the Vomical Lateral near 5th Street (Southeastern boundary of Bard Unit).

Geographic Markers:
Entire Mohave Canal:
UTM 11 Easting: 731100 – 731700 Northing: 3628800 – 3625500
Head: 32°48’28.28”N 114°31’42.07”W to Tail: 32°46’15.52”N 114°32’7.19”W

Quad Map 0124, located within portions of Sections 35 (Start) – 33 (End)
Township 7G, Range 23 E
Bard 7.5’ 1965 PR 1979 topographic map
Base Meridian: San Bernadino

The three 0.5 Mile Sections include: (Only one section will be lined)

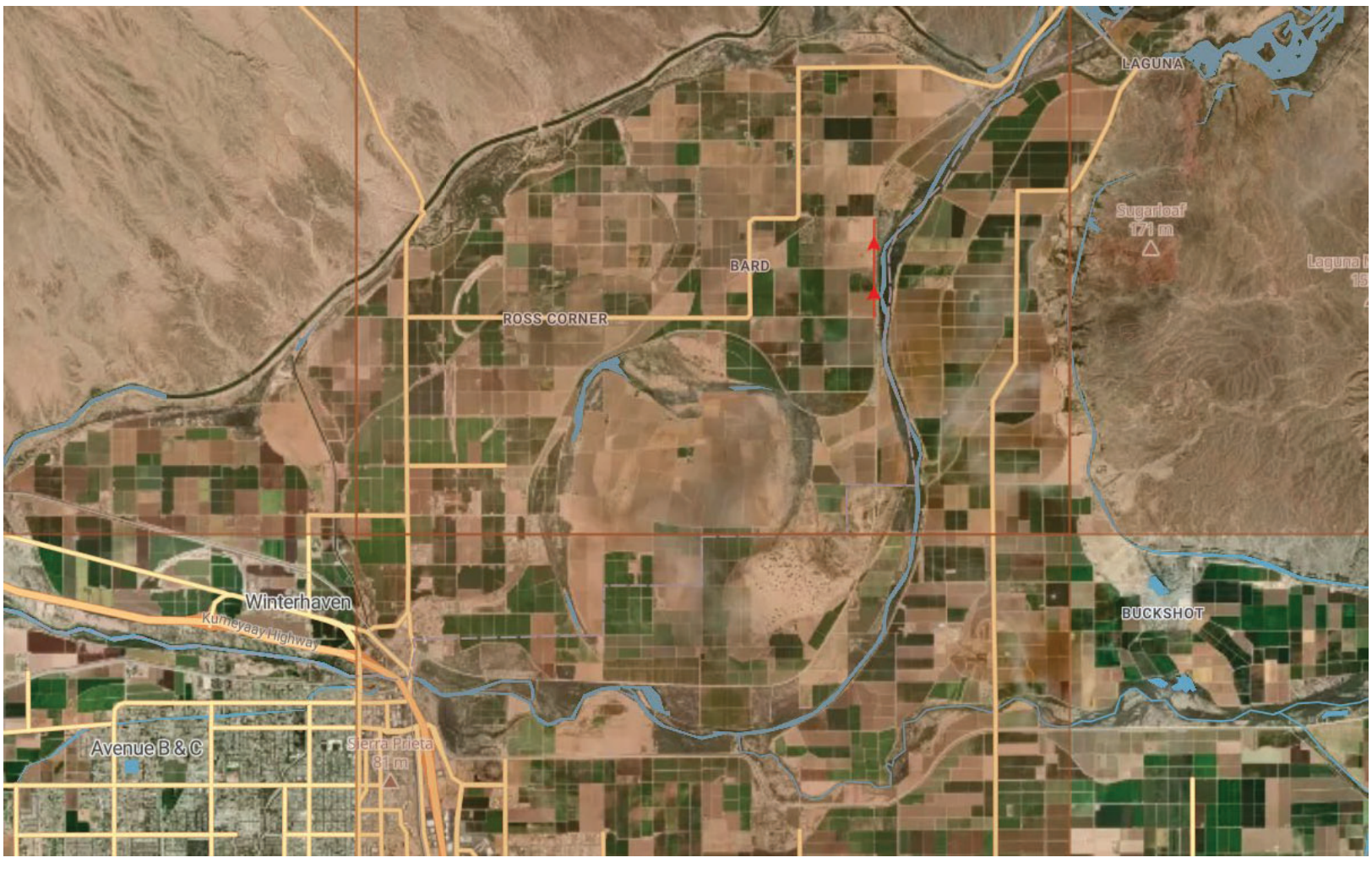
Head Gate and Turnout	32°48’28.28”N	114°31’42.07”W to
Hoopa Check Gate and Turnout	32°48’9.66”N	114°31’59.10”W to
Hopi Check Gate and Turnout	32°47’46.88”N	114°32’3.39”W to
Kawai Check Gate and Turnout	32°47’21.04”N	114°32’3.34”W

Please note, because of the length of time between now and the final NTP, we will reserve the right to select which 0.5 Mile section we will line because it will have to be coordinated with the farmer/producer who will be impacted.

The Mohave Canal provides water to agricultural fields in the Bard Water District (Bard and Indian Units). It is currently a 54% unlined earth canal with a capacity of 40 cubic feet/second. It is

considered one of Bard Irrigation District's major canals and delivers water to six laterals: Hoopa, Hopi, Kawai, Klamath, Maricopa, and Vomical and nine farm turnouts. The canal, laterals, and farm ditches are all above grade and were constructed with nearby borrow material. This design enables it to deliver water via gravity flow. It slowly begins to narrow and raise its bottom depth after the fourth check structure (Hopi) to maintain the required water elevation and flow to farmers downstream.

A map of the Mohave Canal's location is provided on the following page noted by the red arrows.



1.3 Technical Project Description

This project complies with our approved Five-Year Water Conservation Plan and has been priority 1 to BWD and the Quechan Indian Tribe for the last 18 years. The estimated total project costs total around 3 million dollars (USBR's Technical Service Center has estimated 6.4 million). Due to funding limitations (BWD matching), we plan to complete this project in five phases for this grant application. This is Phase 4: Lining 0.5 Mile section of the remaining 1.5-mile section. BWD was

awarded funding on October 21, 2021, for a **Water Conservation Field Services Program Region 8 Lower Colorado Basin Grant** for Engineering Design Work for the 1.5-mile section of the Mohave Canal Lining and Appurtenances ($234,645, BOR $100,000 and BWD $134,645).

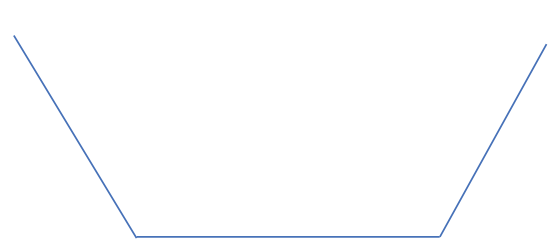
The Mohave Canal was built to deliver water from the eastern to the western portion of the Bard Irrigation District. The Mohave canal runs parallel to the Colorado River and the levee constructed on the west side of the river on the Arizona side. The six laterals run perpendicular to the Mohave Canal flowing westerly. All the turnouts for these laterals are on the west side. Of the nine farm turnouts only one is on the east side. Beginning at the head of the Mohave, the first five check structures are adjacent double gates (side-by-side) that allow for more accurate flow. The last check structure (Maricopa) is single gate to help maintain the required flow at the end of the Mohave Canal where it begins to narrow after the double Hopi Check structure.

The Mohave Canal, itself, and it small levees represent a “conveyance structure.” The fifteen turnouts and six checks are "regulating structures.” The six-road crossing vary from older wooden/concrete slab bridge to the new pipe or box culverts. These “under road” crossings are examples of “protective structures.” Photographs are provided in the Appendix.

The 2.78-mile-long unlined earthen Mohave Canal is a trapezoid in shape and has a maximum top width of 16 LF and a bottom width of 4 LF. It has a maximum depth of 10 LF. Near the end of the Mohave Canal, its top width has narrowed to a maximum 8 LF. It begins to narrow after the Hopi Check Structure (4th Check Structure).

Several turnouts, checks or road crossings will require work to tie them in to the concrete liner. This can include modifying, rebuilding, or replacing some components of a structure. A brief description of these three structures is provided on the following page.

Figure 1
Cross Section of Trapezoid Canal



Turnouts
Most turnouts are for the **six** laterals that deliver water to the west. Turnouts are structures used to divert water from a main supply channel, such as the Mohave Canal to smaller Laterals or ditches. There are nine farm gates (1 on east and 8 on the west side of the Mohave Canal. The turnouts are of three types and photos and descriptions are provided in the Appendix. Each

turnout structure for the six laterals is immediately upstream (North) of the check structure. This prevents loss of water downstream during water delivery.

Check Structures

Six check structures are located within the Mohave Canal. A check is a structure build to regulate or raise the water level in a supply channel. In some cases, a check combines the functions of both a check and a drop: the water level may be raised upstream of the structure and dropped on the downstream side. Almost all the checks appear to be as they were originally constructed. Four types of checks were identified and are listed below. They operate with a Jack-type lifting mechanism, a simple lever device, a hand wheel device, or a wooden handle attached to the top center of a wooden slide. None of the check structures are constructed under a road crossing; they are several feet downstream of each road crossing.

Road Crossings

There are six road crossings crossing along the Mohave Canal, constructed as part of the 1949/1950 Canal Betterment project or later. All the road crossings are covered by compacted dirt. They are also referenced on some maps as 1st through 9th Street. Beginning from the north end of the Mohave Canal they include:

Farm Road	Reinforced Concrete Box Culvert (2000-2005) in 0.5 Mile Section
Norhdahl Road (9TH ST)	Reinforced Concrete Pipe Culvert (Post 1992) in 0.5 Mile Section
Colby Road (8TH ST)	Reinforced Concrete Box Culvert (Post 1990) in 0.5 Mile Section
Whitmore Road (7TH ST)	Concrete Slab and Wood Bridge (1949-1950) – Rebuilt Project 1
Ross Road (6TH ST)	Reinforced Concrete Pipe Culvert (Post 1992) – In Project 1
Berryman Road (5TH ST)	Concrete Slab and Wood Bridge (1949-1950) – Rebuild Project 1

These crossings allow dirt roads and unimproved roads that cross the Mohave Canal continuing on the road or cross into fields or residences. Most have a pipe and culvert or box culvert with dirt, riprap or concrete used for side support. If a check is present the structure usually has more infrastructure present.

Work to be Accomplished and Approach

Post Award/Review:

Environmental Compliance

Historical Architectural and Engineering Report completed July 2021 for entire 2.78 Mile Mohave Canal

Documentation/Submittals to BOR

Final Budget with Backup (Quotes) and Updated Staff, Salaries and Fringe

SOW – Confirmed and Milestone/Task Schedule Updated

Contract Signed and NTP

BWD Project Activities:

Phase 1: Engineering/Design/Planning

Final design meetings, plans, specifications, and estimates for the concrete lining of the lateral and appurtenances (tie-ends, turn-outs, check gates, wingwalls).

Hydrology study/recommendation (Optimum/Required flow rates and pressures, elevations, capacity, etc.)

Phase 2: Construction/Lining the Canal (0.5 Mile Remaining Section of the 2.78 Mile Mohave Canal)

BWD Site Preparation (Clearing and Grubbing)

BWD Haling dirt to fill entire 0.5 Mile trapezoid section, build up walls and bottom

BWD Final grading and compacting (Preparing for trencher)

Contractor/Trencher – Cut trapezoid and pour concrete (boat) to lining of the canal

BWD work crew coordinate with trenching company to tie-in appurtenances. Rebuild or replace, as necessary. The additional finish work may be completed later during scheduled dry downs as to not adversely affect the farmers/producers.

We have an exceedingly small interval to complete the construction portion of this project in order to minimize any adverse effects on farmers (April – July); so, that is why we use a trencher that can complete a project in several weeks (during a dry-down). If we tried to line the sections of canals ourselves, it would take months instead of weeks and the farmers/producers would lose substantial income.

Phase 3: On-Farm Component – Assessment and Planning

We will also provide technical assistance to our affected farmers to evaluate their on-farm irrigation systems/management to determine what improvements, modifications, or equipment they need to successfully handle the subsequent improvements to the Mohave Canal. This will include evaluation of existing irrigation systems (delivery systems, elevations, and grade), hydrological and soil evaluation, needs/shortcomings, recommendations, and EQIP funding

opportunities to update/improve system. This will include long term planning to allow for growth and address future needs.

Phase 4: Farmer's EQIP Grant Applications (This component not funded by this grant.)

Based upon Phase 3 Recommendations and NRCS Report (Provided in Appendix).

Materials:

Concrete

Pipe

Clean Fill Dirt

Fuel and Lubricants

Forms

Steel; Rebar, Eye Hooks, Plates, Strips, Gates

Equipment: (All Bard owned except for trencher): Will use USACOE Region 7 rates for equipment listed on USA COE Table 2-1.

Motor Grader 12M3

CAT 938G

CAT 420F Backhoe

Tracked Excavator 330C

Rubber Tired Excavator 318F

Dump Truck

International Water Truck

Mac/Cozad Lowboy

Flatbed/Tiltbed

Ford F150 PU Trucks (2)

Ford F150 – Crew Cab Truck

Ford XLT Super Crew

Lighting (Night)

TIG Welder

ARC Welder

Stihl Concrete Saw

Tamper

Roller

720 & 830 Capital Trapezoid Trencher w/boat (slip form for concrete) provided by Crawford Associates (Contractor)

1.4 Evaluation Criteria

A. Quantifiable Water Savings

Approximately 1,940 acre-feet/year. Plus, the amount of water required/delivered would be reduced by being able to safely increase flow rate. Subsequently, 23.4% or 1 acre-ft/per 4.27 acre-ft of water or 1.2 acre-ft of water per 1 acre of land would no longer be lost from seepage/transpiration.

1) Describe the amount of estimated water savings. For projects that conserve water, please state the estimated amount of water expected to be conserved (in acre-feet per year) as a direct result of this project.

Please include a specific quantifiable water savings estimate; do not include a range of potential water savings.

Amount of Water Savings **1,940 Acre-Ft/Yr. or 23.4%**

Flow rates are measured at the head gate to the lateral which serves the customer. Run times, start, and stop times are on the ditch rider's inspection record. Volumes are computed and transferred to a water card. Pooling was also done to calculate seepage and evaporation.

PERCENTAGE OF TOTAL SUPPLY 2.25% 1,940 Acre-Feet/Yr.
Based on real-time data provided 86,412 Acre-Feet/Yr. (Total)
in our annual report

2) Describe current losses: Please explain where the water that will be conserved is currently going and how it is being used. Consider the following:

Describe Current Losses: **1,940.3 Acre-Feet/Yr. or 23.4%**

Operational	1,319.0 Acre-Ft/Yr.	
Transportation	133.3 Acre-Ft/Yr.	
Evapotranspiration	157.0 Acre-Ft/Yr. (Increased Flow Rate – Less Transpiration)[1]	
Seepage	331.0 Acre-Ft/Yr. (Increase Flow Rate – Less Seepage)	
Total	1,940.3 Acre-Ft/Yr. Water through Mohave System	8,289 Acre-Ft/Yr.

[1]NRCS/Yuma – Calculated
Calculations (Seepage and evapotranspiration) as well as actual real-time measurements (Volume change over time for section of canal blocked). Volume (Original Water Depth) – Volume (End Water Depth after 24 hours). Volumes (Actual amount of water released).

Percentage of Mohave Water Supply Conserved: 23.4% 1,940.3 Acre-Feet/Yr.
8,289 Acre-Feet/Yr. (Mohave)

- **Explain where current losses are going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground)?**

Current losses are seeping into ground and any extra surface water into BWD's drainage system to return to the Colorado River.

- **If known, please explain how current losses are being used. For example, are current losses returning to the system for use by others? Are current losses entering an impaired groundwater table becoming unsuitable for future use?**

The drainage ditches are a constant O & M problem as they support invasive and noxious weeds, that the farmers/growers constantly mechanically remove along their fields. This further deteriorates the sidewalls and causes continual erosion, so the drainage ditches become wider. We are working with the farmers and NCRS to develop a remedy to provide a better return flow system. However much of this water has high salinity and other contaminants, so it is of poor quality.

- **Are there any known benefits associated with where the current losses are going? For example, is seepage water providing additional habitat for fish or animal species?**

This water loss currently provides little or no benefit to the watersheds along the Colorado River because of its quality.

3) **Describe the support/documentation of estimated water savings: Please provide sufficient detail supporting how the estimate was determined, including all supporting calculations. Note: projects that do not provide sufficient supporting detail/calculations may not receive credit under this section. Please be sure to consider the questions associated with your project type (listed below) when determining the estimated water savings, along with the necessary support needed for a full review of your proposal.**

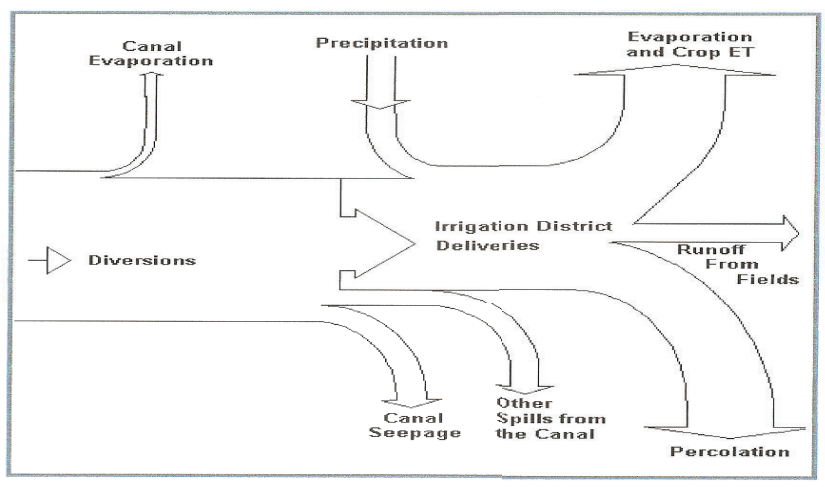
In addition, please note that the use of visual observations alone to calculate water savings, without additional documentation/data, are not sufficient to receive credit under this section. Further, the water savings must be the result of reducing or eliminating a current, ongoing loss, not the result of an expected future loss.

NCRS and USBR assisted with these calculations in 2010 that are included in our 2020 Water Conservation Plan. Tables from this investigation have been provided on the following pages to facilitate your review.

Water Budget Description *(From BWD 2020 Water Conservation Plan)*
The water budget (hydrological balance) was the tool for analyzing water management problems and opportunities, provided that adequate and reliable flow data is available. It is a useful way to organize quantitative information. The water budget approach is very flexible and can be applied in different temporal and scalar dimensions. It can encompass the entire delivery system (water district) or focus on water applied to a field. The water budget can be described for various time periods, such as an annual, monthly, or daily time-step basis. Shorter time steps can assist in identifying problem areas in the system data.

The water budget concept is that the sum of system inflows is equal to the sum of system outflows, assuming the sold moisture is the same at the beginning and end of the period studied. Inflows consist of all the sources of water supply to the distribution system. Outflows consist of all water removed from the system. By comparing measured inflows and outflows in a water budget, it is possible to identify unaccounted for water losses. For example, if the diversion into the canal and all the water deliveries from the canal (i.e., the farm turnouts) were known, the difference between the diversion and the sum of the water deliveries would be the conveyance loss from the canal. This conveyance loss is the result of seepage (-), evaporation (-), precipitation (+), operational spills (-) and the interception of surface-water runoff (=) and ground water flow (+/-). The various components of inflow and outflow available for the water budget are shown in Figure 2.

Figure 2
Water Balance Components



1. Head of Canal (HOC) = Diversions at the Colorado River.
2. Transportation Losses (TL) = Canal Evaporation + Canal Seepage *See Table 1*
3. Operational Spills (OS) = Spills from the canal
4. On-Farm Delivery (OF) = Head of Canal - Transportation Losses - Operational Spills
5. On-Farm Losses = Deep Percolation + Runoff from Fields + Evaporation + Non-Effective Precipitation
6. Net Consumptive Use (NCU) = Consumptive Use (Crop ET) – Effective precipitation See Attached Water Balance on pages 12-21.

Please address the following questions according to the type of infrastructure improvement you are proposing for funding.

1. **Canal Lining/Piping: Canal lining/piping projects can provide water savings when**

irrigation delivery systems experience significant losses due to canal seepage. Applicants proposing lining/piping projects should address:

- **How has the estimated average annual water savings that will result from the project been determined? Please provide all relevant calculations, assumptions, and supporting data.**

  NRCS and USBR assisted with these calculations in 2010 for our first ***Water Conservation Plan*** and they are included in our 2020 Water Conservation Plan. NCRS and USBR completed calculations for seepage and evapotranspiration. They assisted with actual real-time measurements (volume change over time for section of canal blocked).
  Volume (Original Water Depth – Volume (End Water Depth after 24 hours).
  Volumes (Actual amount of water released).

- **How have average annual canal seepage losses been determined? Have ponding and/or inflow/outflow tests been conducted to determine seepage rates under varying conditions? If so, please provide detailed descriptions of testing methods and all results. If not, please provide an explanation of the method(s) used to calculate seepage losses. All estimates should be supported with multiple sets of data/measurements from representative sections of canals.**

  Volume (Original Depth of Water) – Volume (End Water Depth after 24 hours).

- **What are the expected post-project seepage/leakage losses and how were these estimates determined (e.g., can data specific to the type of material being used in the project be provided)?**

  76 Acre-Feet/Year for one 0.5 Mile Section
  We anticipate a 90% reduction or 298 acre-feet/year for the total canal in seepage/leakage losses based on literature review of earthen vs. concrete lined canals.
  Since the upper section is twice the size the 0.5 Mile section would be 77% of 298/3 = 76.5
  Research and Development Office, Reclamation R & D (up to 95%), Xudong Han, *An Experimental Study on Concrete and Geomembrane Lining Effects on Canal Seepage in Arid Agricultural Areas* (86%).
  This will be confirmed by pre-water delivery data for specific intervals/crops with post-data.

- **What are the anticipated annual transit loss reductions in terms of acre-feet per mile for the overall project and for each section of canal included in the project?**

  373 Acre-Feet/Year for one 0.5 Mile Section
  Operational and Transportation loss for total canal is 1,452.3 Acre-Feet per year.
  Since the upper section is twice the size, the 0.5 Mile section would be 77% of 1,452.3/3 = 373

- **How will actual canal loss seepage reductions be verified?**

Ponding (Data from 2010 studies) compared to current ponding studies during several intervals

(High and low temperatures) after canal lined.

- **Include a detailed description of the materials being used.**

Concrete 4000 PSI	Retarder	Plasticizers
Micro NS Fibers	Non-Structured Fibers	NC Accelerators 4000 PSI

2. Renewable Energy

Describe the amount of energy capacity. For projects that implement renewable energy systems, state the estimated amount of capacity (in kilowatts) of the system. Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.

The lining project will not, but because the modernization of this conveyance system, will be able to install solar powered SCADA units on the Mohave Canal to control delivery system flow.

3. Sustainability Benefits

BWD meets the terms of Section 9504 (a)(3)(B) of Public Law 111-11 in that no additional acreage will receive irrigation water saved from this project. We currently abide by our quota and have strived to reduce it by encouraging our growers to implement seasonal fallowing, upgrading to water reduction irrigation delivery systems, and growing crops that require less water. All of our saved water goes to “lower priority” users.

1) Enhancing Drought Resiliency

Living in the southwestern United States in a semi-arid region, BWD is accustomed to natural variations in climate from rare flood events to persistent drought conditions. These shortages have been magnified by climate change and population growth. In order to do our part, we initiated a seasonal fallowing program in 2015 to reduce our water consumption which continues to this day.

Bard Water District (BWD) provides agricultural irrigation water to the Bard Unit and Indian Unit (Fort Yuma Indian Reservation) in Winterhaven and Bard, California. BWD has developed their Drought Contingency Plan to address water shortage issues in the Lower Colorado River Basin. Our goals are to conserve available water and minimize the adverse impacts of water supply shortages or other water supply emergency conditions. We are primarily focused on Best Management Practices and Value Engineering Designs to modernize and upgrade our antiquated and deteriorating infrastructure. This includes lining our canals, laterals, and ditches; installing new gate structures; new technology for meters, measurement devices and water/soil absorption units. We have determined that 30% to 50% of our water loss id due to these poor conditions. Even though we a small, rural water district we border Mexico and are at

the end of the Colorado River on the US side. We have 2nd Priority Water Rights but being at the end of this river system is of great concern to us.

Our second focus is working in partnership with NRCS and our farmers and ranchers to help them to develop strategies for reducing water consumption, without causing adverse economic impacts to themselves and the community. This includes seasonal fallowing, drip, or spray irrigation instead of flood irrigation, planting crops that use less water, as well as anticipating seasonal water fluctuation needs.

We have developed our Drought plan to create a collaboration framework that enables us to easily implement responses and actions as well as being flexible and functional. Our plan is pro-active in that we want to conserve water year-round during both drought and non-drought conditions.

A key element for critical resource planning is an incremental or staged triggering criteria for drought severity and corresponding response actions. Each stage is triggered by an anticipated actual water shortage condition and each stage has several triggering criteria. The triggering criteria is based upon the analysis of the vulnerability of the water source under anticipated drought conditions. The drought condition stage, water shortage triggering criteria, and corresponding demand reduction goals are presented in the Table below.

Level of Water Shortage, Triggering Efforts, and Demand Reduction Goals

Stage Level	Stage Title[1]	Water Shortage & Triggering Criteria	Voluntary Efforts	Reduction Goal
1	Normal	Abnormally Dry Minor Shortage 10%	Seasonal Fallowing, Efficient Irrigation, Low Water Crops, Measurement Devices – 5% Reduction Capital Improvements: Conveyance Repair/Lining (3 Mile) – 5% Reduction	10%
2	Alert	Moderate Shortage 11 – 25%	Cumulative Effect – Baseline 5% Farmers Efforts Conveyance (3 Mile) Each Year Adds 5% so 10%	15%
3	Warning	Severe Drought 26% - 35%	Cumulative Effect – Baseline 5% Farmers Efforts Conveyance (3 Mile) Each Year Adds 5% so 15%	20%
4	Critical	Extreme Drought 36% - 50%	Cumulative Effect – Baseline 5% Farmers Efforts Conveyance (3 Mile) Each Year Adds 5% so 20%	25%
5	Emergency	Exception Drought Over 50%	Cumulative Effect – Baseline 5% Farmers Efforts Conveyance (3 Mile) Each Year Adds 5% so 25%	30%

[1]Most drought occurs after several years of little rainfall so have shown a cumulative effect of our voluntary efforts. For example, for any year we plan to conserve 10%, 2nd year 15%, 3rd year 20%, 4th

year 25%, and 5th year 30% due to our yearly infrastructure improvements and growers' actions.

Enhancing drought resiliency.

- **Does the project seek to improve ecological resiliency to climate change?**

We have limited natural resources in the fragile desert environment, other than water. We are using a "Best Practices" model by **conserving, protecting, and restoring** our natural resources (water and subsequent watersheds and habitats) through BWD system improvements and On-Farm voluntary activities (as discussed in 1.4.4 On Farm Criteria). We also will comply with Executive Order 14008: Tackling the Climate Crisis at Home and Abroad and the 30 – 30 Initiative.

- **Will water remain in the system for longer periods of time? If so, provide details on current/future durations and any expected resulting benefits (e.g., maintaining water temperatures or water levels).**

No, which will help conserve water by reducing losses from transmission, seepage, and transpiration. We will be able to increase flow rates and water levels (elevation) so less water will be required. There will also be reduced water logging.

- **Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Please describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project or is subject to a recovery plan or conservation plan under the Endangered Species Act (ESA).**

Water left in the Lower Colorado System will benefit the Yuma Clapper Rail and the Southwest Willow Flycatcher. These birds nest and raise their young along the Lower Colorado River watershed in the spring. This watershed is the corridor for wildlife preserves as well as small lakes and recreational areas. We have a local conservation group Friends of Haughtlin Lake who are working to protect the watersheds in our area. By conserving water, we promote biodiversity, endangered species in this desert habitat rely on the Lower Colorado River and its backwaters, riparian areas and natural lakes and the marshy habitat is supports for nesting, spawning and daily life. It also is part of the migration pathway for many bird species. Their habitat was greatly affected by the dams constructed along the Colorado River and then by the increased demand for water by towns and farming. During drought conditions this is intensified, and their critical habitat threatened, especially during the summer when water demands are increased.

Numerous riparian and marshy areas form a perimeter between the agricultural fields and the All-American Canal, the Colorado River (East) and desert (West) as well as the Mesas (North) that divert runoff from rainfall into overshoots maintaining natural riparian areas.
Bard Water District is a participant in the Multi-Species Conservation Plan/Program that was developed for the Lower Colorado River area. We work closely with AZ Fish and Game and the Audubon Society. We alert and assist Fish and Game with mammal rescues from the large

canals and participate in Bird Species Counts and Surveys.

Endangered Species in Bard Water District

Birds	Reptiles	Fish	Mammals
SW Willow Flycatcher Nest along our river corridor.	Desert Tortoise Nest/Feed in washes with creosote bushes.	Colorado Pike Minnow – Not seen below Glen Canyon Dam anymore.	Lesser Long Nosed Bat Bat Boxes were placed along our river corridor to improve habitat.
Yuma Clapper Rail (Ridgeway) Nest in dense Cattail and Tule marshes along our river corridor.	Flat Tailed Horn Lizard Resides in areas surrounding our district, eats Harvester ants.	Razorback Sucker Not seen below Grand Canyon anymore.	Sonoran Pronghorn Rarely sighted, primarily Big Horn Sheep, Deer, and Wild Donkeys utilize washes and river for food and water. YPG to the North provides water stations.
Burrowing Owl Nest on ground burrows near agricultural fields.			

- **Please describe any other ecosystem benefits as a direct result of the project.**

This project utilizes sound hydrological strategies coupled with time-tested structures (concrete lining) to create a more efficient and responsive water delivery system. Located in a rural area, and surrounded by desert, we are uniquely positioned to promote stewardship. Through our partnerships with our water users (farmers) we are creating a balance between water conservation, planning, efficiency, and cost savings. We are addressing issues brought about by changes in the environment, especially drought. We are using a “Best Practices” model by conserving water and subsequent watersheds and habitats by a variety of voluntary activities (BWD as well as On-Farm) as previously discussed (seasonal fallowing, irrigation method, crop vs. water requirements , system delivery improvements, etc.). Through our partnerships with our water users (farmers) we are creating a balance between water conservation, planning, efficiency, and cost savings.

Each of us, the Colorado River and Gila River areas create watershed and riparian areas. The buffer zone that exists between us and that area consists of desert with washed (replenished by rainfall, complemented by the surrounding mountainous terrain). Most of the visible habitat is located along this river corridor, with native plants (reeds, cottonwood, willow, and sedges) then native shrubs and trees. These provide habitat for our native species as well as migratory birds. This watershed creates a natural wildlife corridor from New Mexico to California. We are

southwest of the Gila River (and its tributaries: Agua Fria and Salt Rivers) that continues west to join the Lower Colorado River in Yuma that support wildlife preserves (Kofa, Mitry Lake and Cibola). We work closely with our state and federal agencies to solve conflicts from wildlife to agricultural fields and water delivery systems.

The project, by increasing surface water and ground water retention, will inherently improve water quality by increasing volume and promoting natural attenuation from aquatic plants and from its flow its 2-mile sand and gravel bottom. These plans will improve water supply reliability and sustainability by lining this canal (infrastructure), conserving water (significantly reducing water loss), and increasing efficiency of the system.

- **Will the project directly result in more efficient management of the water supply? For example, will the project provide greater flexibility to water managers, resulting in a more efficient use of water supplies?**

Yes, any canal lining project, results in a more efficient management of water supply by

1) Reduced water volume requests due to more reliable water levels (elevation) and fater flower rates.
2) Reduced water volume requests due to improved check/turnout gates (leakage).
3) Reduced water volume requests if drip lines or sprinklers used instead of flood irrigation.
4) Reduced water volume requests due to lining ditches or repairing concrete (reduce seepage and transpiration).
5) Reduced water volume requests due to more accurate field data (size and soil intake characteristics).
6) Reduced water volume requests due to system assessment and subsequent improvements.
7) Prevent monetary loss and wasted water from crops destroyed because of uncontrolled flooding or bacterial contamination.

Addressing a specific water and/or energy sustainability concern(s).

- **Explain and provide detail of the specific issue(s) in the area that is impacting water sustainability, such as shortages due to drought and/or climate change, increased demand, or reduced deliveries.**

The recent Lower Colorado Drought Contingency Plan signed in 2019 clearly demonstrates the seriousness of the water supply for the Lower Colorado River. This project is part of our Drought Plan to modernize 1-3 miles of our conveyance system to reduce our water demand (as well as seasonal fallowing). As should in the plan, most districts are facing mandatory reductions in time of drought or shortfalls. Bard Water Users have Priority Two rights and as such have adequate water for agricultural use. We, however, as stewards of the Colorado River, have been putting forth an effort since 2013, to conserve water so it is available to other lower priority users. Every modernization project we complete contributes to our water conservation

effort.

- **Explain and provide detail of the specific issue(s) in the area that is impacting energy sustainability, such as reliance on fossil fuels, pollution, or interruptions in service.**

The following local issues impact our energy sustainability:
Brown-outs due to high energy usage, especially in desert summers.
Power outages due to windstorms.
Pollution – We are a non-attainment area for dust (PM-10).
Fuel supply/costs for vehicles and farm equipment.

- **Please describe how the project will directly address the concern(s) stated above. For example, if experiencing shortages due to drought or climate change, how will the project directly address and confront the shortages?**

The following steps can be taken to address these issues:
Solar power for critical units
Electric vehicles or low carbon emissions
EQIP grants to replace older farm equipment
Wind rows or cover crops to reduce dust

- **Please address where any conserved water as a result of the project will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.**

Conserved water will go to lower priority users. The water we save will remain in the system under the stewardship of BOR because it will not be diverted. They will be able to determine its best use. This project will also enable us to conserve approximately 24% of the water going through the delivery system, allowing us to be pro-active in addressing drought, shortfalls, and other critical water issues.

- **Provide a description of the mechanism that will be used, if necessary, to put the conserved water to the intended use.**

USBR controls water not requested (due to less volume needed after lining) and water that enters our drain systems returns to the Colorado River.

- **Indicate the quantity of conserved water that will be used for the intended purpose(s).**

Entire canal which this project will complete – 1,940 Acre-Ft/Yr. or 23.4%; for one 0.5 Mile section 77% of 1,940/3 = 498 Acre-Fr/Yr.
Flow rates are measured at the head gate to the lateral which serves the customer. Run times, start, and stop times are on the ditch rider's inspection record. Volumes are computed and transferred to a water card. Pooling was also done to calculate seepage and evaporation. Since

the upper section is twice the size of the 0.5 Mile section would be 77% of 298/3 = 76.5 Research and Development Office, Reclamation R & D (up to 95%), Xudong Han, *An Experimental Study on Concrete and Geomembrane Lining Effects on Canal Seepage in Arid Agricultural Areas* (86%).
This will be confirmed by pre-water delivery data for specific intervals/crops with post-data.

Other project benefits.

(1) Combating the Climate Crisis:

- **Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.**

Reduced time required for O & M will reduce CO_2 emissions from vehicles and heavy equipment.
Water conservation during drought conditions brought about by climate change.
EQIP grants for farmers/producers for newer equipment (better emission rating).
USDA grant for solar powered (lights, pumps, gate controls, refrigeration).

- **Does this proposed project strengthen water supply sustainability to increase resilience to climate change?**

Yes, by conserving water, increasing efficiency and water quality. Especially since the local residents and Tribes rely on wells for their municipal water supplies. Increase water can also be used to fight fires in this rural area where there are few hydrants.

- **Will the proposed project establish and utilize a renewable energy source?**

The lining project will not, but because the modernization of this conveyance system, will be able to install solar powered SCADA units on the Mohave Canal to control delivery system flow.

- **Will the project result in lower greenhouse gas emissions?**

The EPA estimates that only 10% of Greenhouse gas emissions come from agriculture, and they are primarily from livestock, soils, and rice production. However, this project, the lining of the Mohave Canal can reduce emissions by:
Improving operating practices – less time required for O & M and vehicle use.
On-farm components, EQIP grants to farmers to replace older equipment with high emission releases as well as be able to use fuel with less carbon output.
Improving soil health, better water quality from lined conveyance systems, less CO_2 and N_2O emissions.

(2) Disadvantaged or Underserved Communities:

- **Does the proposed project directly serve and/or benefit a disadvantaged or historically underserved community? Benefits can include, but are not limited to: public health and safety through water quality improvements, new water supplies, new renewable energy sources, or economic growth opportunities.**

Yes, West Imperial County is a rural, low-income, disadvantaged community (Bard, Winterhaven, and Fort Yuma Indian Reservation).

Bard Water District Disadvantaged Community Variables		
Variable	**Winterhaven**	**Quechan Indian Tribe**
Population	192	1,277
Low income, high and/or persistent poverty	MHI[1] $10,736 64.8% Live in Poverty	MHI[1] $27,793 36.4% Live in Poverty
High unemployment and underemployment	53.8%	15.7%
Racial and ethnic residential segregation, particularly where the segregation stems from discrimination by government entities	17% Native American 35.9% Hispanic Median Age 72.6	100% Native American or Family Members
Linguistic isolation	Spanish Speaking	Spanish Speaking
High housing cost burden and substandard housing	90% Substandard	70% Substandard
High transportation cost burden and/or low transportation access	Limited Public Transportation	Limited Public/Tribal Transportation
Disproportionate environmental stressor burden and high cumulative impacts	Poverty Level Magnify	Poverty Level Magnify
Limited water and sanitation access and affordability	Archaic System	Archaic System
Disproportionate impacts from climate change	Poverty Level Magnify	Poverty Level Magnify
High energy cost burden and low energy access	Utility Rates High	Utility Rates High
Access to healthcare	Limited, small clinic	IHS for BIA registered

[1]MHI = Median Household Income

As evident in the Table above, the population includes a majority of Hispanics and Native Americans in the BWD. This underserved and underrepresented community reside in a sparsely populated rural area, with little or no tax base to support their infrastructure. They are isolated by historically being considered less than equal as Native Americans and as agricultural workers. Although age is not a variable, the median age for those living in Winterhaven is 72.6, seniors also being an underserved population.

- **If the proposed project is providing benefits to a disadvantaged community, provide sufficient information to demonstrate that the community meets the disadvantaged community definition in Section 1015 of the Cooperative Watershed Act, which is defined as a community with an annual median household income that is less than 100 percent of the statewide annual median household income for the State, or the applicable state criteria for determining disadvantaged status.**

The nearest town to the project area are Bard and Winterhaven, which includes Fort Yuma Indian Reservation. These locations are considered severely disadvantaged and economically distressed communities. THE MHI for Fort Yuma is $27,188 and the MHI for Winterhaven is $9,719 which are both substantially lower than the California MHI of $67,169. Unemployment Rate is more than 2% higher than the statewide average. Fort Yuma's unemployment rate is 22.1% and Winterhaven's unemployment rate is 57.1%. This project will serve 1,295 residents on the Fort Yuma Indian Reservation because this structure is on the Indian Unit. It will reduce the costs due to water losses during use as well as costs for this large project.

- **If the proposed project is providing benefits to an underserved community, provide sufficient information to demonstrate that the community meets the underserved definition in E.O. 13985, which includes populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.**

The rural area represents a population that has historically been excluded from funding sources, planning, and development. The Quechan Indian Reservation and the cities of Bard and Winterhaven represent a large minority of Hispanics and Native Americans interspersed with families from early settlers. The Quechan Indian Tribe were excluded from the initial water right negotiations and had to sue the federal government over 30 years ago to be included. They only received compensation for the water but nothing for the impact on their way of life that changed drastically (using natural flooding for managing and harvesting their produce and desert plants as well as the cleansing and reconstructing their homes each year).

(3) Tribal Benefits:

- **Does the proposed project directly serve and/or benefit a Tribe? Will the project increase water supply sustainability for an Indian Tribe? Will the project provide renewable energy for an Indian Tribe?**

Yes, the Quechan Indian Tribe is part of the Indian Irrigation Unit which is served by this system. The Cocopah Tribe in AZ also receives water through the Bard system via the Yuma Main Canal. **It also meets Executive Order 13985: Advancing Racial Equity and Support of Underserved Communities.**

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

Yes, by conserving water for the Tribe, especially since they rely on wells for their water supply.

(4) Other Benefits: Will the project address water and/or energy sustainability in other ways not described above? For example:

- **Will the project assist States and water users in complying with interstate compacts?**

Yes, it would make it easier, especially if they're during drought/water shortages that mandate reductions.

- **Will the project benefit multiple sectors and/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?**

Yes, it will go to lower priority users who are most affected by water shortages. USBR can use this water to aid other growers, municipalities, or other nearby entities. This will be especially important during times of shortages and drought.

- **Will the project benefit a larger initiative to address sustainability?**

State of California Integrated Water Management Program – Planning and program development.
Demonstrates strategies and actions for small, disadvantaged, rural communities.
USBR Colorado River Lower Basin Drought Contingency Plan – recently signed.
We will work to incorporate components of the goals of these documents into our Ten-Year Capital Improvement Plan, Water Conservation Plan, and funding strategies.

- **Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin?**

Yes, our diverse water conservation efforts are three-fold and have a cumulative effect.

a) We carefully balance our **voluntary seasonal fallowing** program (number of acres and time interval – early spring) to reduce water use and prevent adverse economic impact to our workers and ourselves.
b) With infrastructure improvements/modernization projects planned each year based on the 10-Year Capital Improvement Plan, USBR Technical Service Center evaluation of our system for Measurement Devices, Repairs, Replacements, and Conveyance Lining, and our Water Conservation Plan. The voluntary efforts demonstrate our projected water savings from these two components (See Table below from our Drought Plan).
c) With stepwise modernization of our irrigation systems, growers can then proceed with their improvements funded by the USDA/EQIP.

4. Complementing On-Farm Irrigation Improvements

If the proposed project will complement an on-farm improvement eligible for NRCS assistance, please address the following:

- **Describe any planned or ongoing projects by farmers/ranchers that receive water from the applicant to improve on-farm efficiencies.**
  - **Provide a detailed description of the on-farm efficiency improvements.**

This will complement projects already developed by our local NRCS office to assist growers in this area. One grower already received EQIP funding for water that passes through our system for lining his ditches. NRCS has new projects listed for twenty-one land parcels. We hosted a

meeting for growers about EQIP and USDA had a workshop here in 2019. We also have contacted Bobbi McDermott, a retired NRCS employee, and she has met with us several times and has agreed to work with our local growers. We have provided our growers a tentative list of accepted projects and have met with our new NRCS representative. We are also reviewing the new USDA Regional Conservation Partnership Program and meeting with our Board to develop strategies for this new grant opportunity. The three growers listed below have provided Letter of Intent to collaborate with Bard Water District and NRCS for an EQIP grant.

Acreage Likely to be Improved: 1.216.93 Acres out of 1,804 acres or 67.5%

Harrison Farms	682.2 Acres
Top Flavor Farms	221.73 Acres
Tanimura & Antle	313 Acres

Once the Mohave Canal is lined, flow rates and elevations determined; NRCS and our growers will work together to address their concerns and identify potential system improvements. This could include:

1. Check Gate Systems – New Check Gates – replacing poorly functioning or leaking, increasing size, or upgrading type.
2. Ditches – Concrete lining, increasing size or elevation.
3. Irrigation Systems – Purchasing drip lines or sprinklers.
4. Evaluating Field Irrigation Systems – Surveys/Measurements – Field elevations, water/sold absorption rates as well as cost analysis.
5. Hydrology Study – Flow rates and volumes – modeling to determine most efficient design
6. Measurement Devices – Installing flow meters, water/soil absorption
7. Innovative Methods to kill bacteria in concrete line (copper or zinc composites in concrete mortar), chemical additives to water supply, UV, or ozone treatment.

Our local NRCS office has developed a Conservation Implementation Strategy for water conservation improvements for a total of twenty-one fields. This report has been provided in Appendix. A list of **proposed CIS/EQIP** project sites from this report that receive water from the Mohave Canal have been provided below:

Harrison Farms[1]	Glenda Spencer	H. Berryman	Martha Hill
Top Flavor Farms[1]	Evelyn Berryman	Tanimura & Antle[1]	

[1]Three growers have provided Letters of Intent/support for this grant application. Their acreage encompasses 67.5% of the land served by the Mohave Canal. They also lease other small parcels of land in this area.

- **Have the farmers requested technical or financial assistance from NRCS for the on- farm**

efficiency projects, or do they plan to in the future?

Yes, the farmers served by Bard Water District have collaborated with our local NRCS office and successfully applied for EQIP grants for on-farm water efficiency improvements.

- **If available, provide documentation that the on-farm projects are eligible for NRCS assistance, that such assistance has or will be requested, and the number or percentage of farms that plan to participate in available NRCS programs.**

On-farm projects are beneficiaries of NCRS planning and recommendations for water efficiency improvements. These efforts have resulted in EQIP funding for on-farm projects.

- **Applicants should provide letters of intent from farmers/ranchers in the affected project areas.**

Letters of support are included in the Appendix from farmers in the project area.

- **Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.**

Steve Alameda, Top Flavor Farms, received EQIP funding in 2018 for water that passes through our system for concrete lining of two earthen ditches. Other growers (34.5% of the land) that receive water from the Mohave include: Ross Martin, Griffin Family Properties, Anthony Costa and Sons, NexGen Farms, and Johnny Cloud. We plan to encourage these growers to collaborate with NRCS for EQIP funding also.

- **Will the proposed WaterSMART project directly facilitate the on-farm improvement? If so, how? For example, installing a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip-irrigation.**
  OR
- **Will the proposed WaterSMART project complement the on-farm project by maximizing efficiency in the area? If so, how?**

The Mohave Canal is badly deteriorated and requires constant monitoring during water delivery to reduce erosion and prevent overflows. The flow is also reduced which in-turn requires more water to be released. There is also the problem of bacteria (E.coli) being present in the bottom sludge. All these conditions negatively impact the farmer. If the Mohave is lined, a great volume water can be delivered faster and more efficiently so less water is needed (shorter duration); less damage from erosion and risks of bacterial contamination; and less chance of overflows and uncontrolled flooding causing contamination subsequent destruction of an entire crop. Also, we will collaborate with our farmers to determine what best practices/improvements are needed to meet the requirements of the newly lined canal. This will include elevation of existing irrigation systems (delivery systems, elevations, and grade), hydrological and soil evaluation, needs/shortcomings, recommendations. This will also include long term planning to allow for growth and to address future needs.

We will assist with their EQIP grant (e.g., irrigation system upgrades – more efficient/less water needed, structural improvements (gates, outlets, drains, sidewalls, aprons) construction (leveling, trenching, compaction, fill) or monitoring equipment (moisture sensors, etc.).

The water currently delivered from the Mohave Canal must flow slowly for several reasons.

1) Prevent the erosion of the sidewalls.
2) Prevent overflow along the Mohave and uncontrolled water loss.
3) Prevent uncontrolled flooding of the agriculture fields and subsequent contamination of produce (crops must be destroyed).
4) Minimize agitating the bottom sludge (loaded with bacteria).

Once the Mohave Canal is lined, flow rates and elevations determined, NRCS and our farmers can work together to improve their end of the system. This could include their check systems, ditches, irrigation systems, field elevations, soil monitoring, measurement devices, etc. Based on collaboration with NRCS, our growers will select their project to improve efficiency, conserve water, and subsequently reduce their costs.

- **Describe the on-farm water conservation or water use efficiency benefits that are expected to result from any on-farm work.**

These **irrigation efficiency improvements** can be achieved by EQIP funding for one or more of these improvements:

1) Replacing deteriorated leaking check gates and structures to **prevent operational losses**.
2) Concrete lining, thus **eliminating seepage** issues from deteriorated earthen field ditches and deteriorated concrete ditches. Also **reduce evaporation** and **transmission** losses due to less time spent in conveyance system.
3) Installing larger capacity concrete ditches containing high-flow turn-out structures **for better management and to reduce water quantities needed**.
4) More closely matching water volume to field dimensions and soil moisture intake qualities structure **for better management and to reduce water quantities needed**.
5) Purchasing/utilizing drip irrigation or sprinklers when practical (seed germination, light watering) and cost effective **to reduce water quantities needed**.
6) Evaluating Field Irrigation Systems – Surveys/Measurements – Field elevations, water/soil absorption rate as well as cost analysis **for better water management and efficiency**.
7) Hydrology Study – Flow rates and volumes – modeling to determine most efficient design since volumes the most constant FACTOR **for better water management and efficiency**.
8) Innovative Methods to kill bacteria in concrete liner (copper or zinc composites in concrete mortar), chemical additives to water supply, UV, or ozone treatment to

eliminate catastrophic crop destruction.

9) Improved conveyance and perimeter berms to prevent uncontrolled flooding to **eliminate catastrophic crop destruction**.

- **Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.**

Entire Canal 1,940 Acre-Ft./Yr. or 23.4% for one 0.5-mile section 77% of 1,940/3 = 498 Acre-Ft./Yr.

Flow rates are measured at the head gate to the lateral which serves the customer. Run times, start, and stop times are on the ditch rider's inspection record. Volumes are computed and transferred to a water card. Pooling was also done to calculate seepage and evaporation.

Percentage of Total Supply	2.25%	1,940.3 Acre-Ft./Yr.
Based on real-time data provided in our annual report		86,412 Acre-Ft./Yr. (Total)

Describe Current Losses:		**1,940.3 Acre-Ft./Yr. or 23.4%**
Operational	1,319.0 Acre-Ft. Yr.	
Transportation	133.3 Acre-Ft./Yr.	
Evapotranspiration	157.0 Acre-Ft./Yr. (Increased Flow Rate = Less Transpiration)[1]	
Seepage	331.0 Acre-Ft./Yr. (Increased Flow Rate = Less Seepage)	
Total	1,940.3 Acre.-Ft./Yr.	Water through Mohave System 8,289 Acre-Ft./Yr.

[1]NRCS/Yuma – Calculated
Calculations (Seepage and evapotranspiration) as well as actual real-time measurements (Volume change over time for section of canal blocked). Volume (Original Water Depth) – Volume (End Water Depth after 24 hours). Volumes (Actual amount of water released).

Percentage of Mohave Water Supply Conserved: **23.4%** 1,940.3 Acre-Feet/Yr.
8,289 Acre-Feet/Yr.
(Mohave)

Support/Documentation of Estimated Water Savings
NCRS and USBR assisted with these calculations in 2010 that are included in our 2020 Water Conversation Plan. ***Tables from this investigation were provided on pages 12-22 to facilitate your review.***
NCRS completed calculations for seepage and evapotranspiration.
BOR assisted with actual real-time measurements (Volume change over time for section of canal blocked).

Volume (Original Water Depth) – Volume (End Water Depth after 24 hours).
Volumes (Actual amount of water released).

- **Please provide a map of your water service area boundaries. If your project is selected for funding under this NOFO, this information will help NRCS identify the irrigated lands that may be approved for NRCS funding and technical assistance to complement funded WaterSMART projects.**

A map of Bard Water District area boundaries has been provided in the Appendix. Our district includes the Bard Unit and the Indian Unit, see the Appendix for Background and History.

5. Planning and Implementation

Project Planning:
Does the applicant have a Water Conservation Plan and/or System Optimization Review (SOR) in place? Does the project address an adaptation strategy identified in a completed WaterSMART Basin Study? Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place. Including a specific excerpt or a link to the planning document may also be considered where appropriate.
This project has been in the planning stages for the last 18 years, but in 2017 this became a reality when USBR listed it as a Priority 2 in the USBR Reservation System Evaluation Project conducted in January 2017: *Technical Memorandum No. USBR 35-RDE-8150-2016-02*. It is also identified as our **Number One** priority in our Ten-Year Capital Improvement Plan This project is also listed on our Water Conservation Plan and on page 14 of our Drought Contingency Plan.

The main reason it has been difficult to implement this project is because it is a very large undertaking and the costs are prohibitive. We are a small, rural water district, and it is difficult for us to compete for the larger grants based on water savings. However, if you compare the percentage of our water savings instead of the quantity, it is quite high (30-50%). We have been successful leveraging funding for small projects with less competitive funding sources (Small-Scale and Lower Colorado River Region) and have developed a strategy to complete these larger projects in 2-5 Phases to be able to leverage our 50% funding match. We anticipate the lining of the entire Mohave Canal to take place with five funding components or phases with work performed between 2021-2024. We have met with USBR, our Engineering/Design contractors and discussed this project many times. We have developed a strategy to succeed.

The strategy we developed for the entire 2.78 Mile Mohave Canal is listed in the phases below:

In August 2021, Project 1: 2019 AWCE Grant: Concrete Lining of the Lower Tail (1.28 Miles or 46% of the length) of the Mohave Canal was completed. Our partnership with farmers/producers enabled us to complete this long section of because they agreed to seasonal fallowing (April-June) so we could complete the work.

In October 2021, Project 2: WCFS Grant Application was awarded for Engineering and Design of the remaining 1.5 Mile Section. Estimates to line the remaining 1.5 Mile section ranges from $2,000,000 - $3,000,000, so we will split this section into thirds at major checks/turnouts).

In May 2022, Project 3: WEEG was awarded to complete the first 0.5-mile section of the remaining 1.5-mile section of the Mohave Canal. This section is to be constructed during summer 2023.

This application will compete an additional 0.5-mile section of the Mohave Canal, projected for completion summer 2024.

Provide the following information regarding project planning:

- **Identify any district-wide, or system-wide, planning that provides support for the** proposed project. This could include a Water Conservation Plan, SOR, Drought **Contingency Plan or other planning efforts done to determine the priority of this project in relation to other potential projects.**

The Project conforms and meets the goals of our Water Conservation Plan, Capital Improvement Plan, and Drought Contingency Plan by:

1) Engineering/Design, Hydrology Studies, and Assessments for **Better Water Management** for water delivery and distribution form the Mohave Canal.
2) Subsequent construction actions (Appurtenances) will **increase water supply reliability and sustainability.**
3) **Seepage 331 acre-feet/year and transpiration 157 acre-feet/year will be significantly reduced** when water is delivered from the Colorado River via the All-American Canal and Reservation Main Canal to the Mohave Canal. **Laterals that run off the Mohave Canal include: Vomical, Maricopa, Klamath, Kawai, Hopi, and Hoopa**.
4) **Operational and evaporation losses will also be reduced.**
5) **Improvement and modernization of our overall system** and infrastructure, specifically, by developing engineering/design plans for the Mohave Canal Lining Project.
6) Accomplish BWD and Agricultural Water Use Efficiency goals of Water Conservation.
7) Accomplish BWD and Agricultural Water Use Efficiency goals of preventing possible **water-related crisis (shortfalls and flooding).**
8) **Mitigate future conflicts or risks** in this high-profile area.
9) **Develop Partnerships:** We will work together with NRCS and our farmers (Water users – Bard Unit) and USBR to share costs by leveraging funding and resources. Our most valuable resources are our seasoned staff and our own well-maintained heavy equipment.
10) Canals and laterals that are lined are **easier to maintain, thus more time can be allotted to other deteriorated sites that require more overwatch, O & M, repair/replacement.**
11) **Reduce risk of bacterial contamination of produce from the E. Coli present in bottom**

sludge that we cannot effectively remove without increasing the depth of the canal which then requires more water to be utilized to maintain the required elevation for delivery. For food safety, irrigation water is required to be treated with agents (acidic/chlorine) to kill bacteria during irrigation (sprinklers), so the water is not ideal for consumption by wildlife.

12) **Reduce invasive and noxious plant species.**
13) When the Mohave is lined, it will be able to provide water at a higher elevation so the **flow will be faster further reducing the quantity required by around 20%**. Higher elevations raise the water table which helps maintain our riparian area.
14) When there is adequate resources and habitat beyond the fields in these riparian, groves, washes, and marshy areas, there is **less rick of contamination from bacteria in the conveyance systems and from the fields.**

- **Describe how the project conforms to and meets the goals of any applicable planning efforts and identify any aspect of the project that implements a feature of an existing water plan(s).**

Pre-Project Estimations of Baseline Data:
We have already completed the following tests that are included in our Water Conservation Plan.
Ponding Tests: Seepage and Evaporation
Inflow/Outflow Testing: data is collected whenever water is released. This is incorporated into our data base. We can generate report for early and late seasons adding the ratio of acre-feet diverted to acre-feet received to calculate efficiency. Adjustments are made for evaporation (including season/ambient temperatures).

Post-Project Methods for Quantifying Benefits of Canal Lining:
Pre-project results will be compared with Post-project results to calculate water savings. We will compare ratio of acre-feet diverted to acre-feet received to calculate efficiency. These stats will be updated in our Water Conservation Plan. This data will be provided in our SOR plan.

Project Readiness:

- **Identify and provide a summary description of the major tasks necessary to complete the project. Note: please do not repeat the more detailed technical project description provided in Section D.2.2.2. *Application Content.* This section should focus on a summary of the major tasks to be accomplished as part of the project.**

Summary of Major Tasks

Phase 1: Engineering/Design (E & D has been completed for remaining 1.5 Mile Canal)
Design meetings, Plans, Specifications, and Estimates for the Concrete Lining of the Lateral and Appurtenances (Tie-Ends, Turn-outs, Check Gates, Wingwalls).

Phase 2: Construction/Lining the Canal (0.5 Mile Section of the remaining 1.5 Mile Canal)
Site Preparation, Earthwork: Trenching, Grading and Compacting, Concrete Lining of the Canal and Constructing Appurtenances.

Phase 3: On-Farm Component – Assessment and Planning
We will also provide technical assistance to our affected farmers to evaluate their on-farm irrigation systems/management to determine what improvements, modifications, or equipment they need to successfully handle the subsequent improvements to the Mohave Canal.

Phase 4: Farmer's EQIP Grant Applications (This component not funded by this grant.)
Based upon Phase 3 Recommendations.

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

There are no permits required for this project.

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

BWD was awarded a WCFS Program grant in October 2021 for the Engineering and Design for Mohave Canal Lining and Appurtenances for the remaining 1.5 Miles. The E & D Project was completed in May 2022 so the project is shovel ready.

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

There are no new policies or administrative actions required to implement the project.

- **Please also include an estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates. Milestones may include, but are not limited to, the following: complete environmental and cultural compliance; mobilization; begin construction/installation; construction/installation (50% complete); and construction/installation (100% complete). Was the expected timeline for environmental and cultural compliance discussed with the local Reclamation Regional or Area Office?**

Tasks and Milestones with Tentative Schedule

Phase	Milestones/Tasks	Duration Weeks	Interval
Pre-Work	Activities		

	USBR Environmental Compliance	0	HAER Completed July 2021
	USBR – USBR Review and Award NTP	12	3/31/23 – 6/30/23
	BWD Contractors' Bid Packages/Award/Selection	4	7/1/23 – 8/1/23
Work	**Activities**		
1	Engineering/Design for Lining Mohave Canal	0	Completed
	Structural Design, Lining, Appurtenances 60%	12	9/1/23 – 12/31/23
	Structural Design, Lining, Appurtenances 90%	8	1/1/24 – 3/1/24
	Final Design/Engineering BOR Approved 100%	8	3/1/24 – 5/1/24
2	Construction – Lining Mohave Canal	16	4/1/24 – 7/31/24
	Bid Packages/Award/Selection	4	4/1/24 – 4/30/24
	Site Preparation: Earthwork, Grading/Compacting	4	4/1/24 – 4/30/24
	Trenching and Concrete Lining	12	5/1/24 – 7/31/24
	Concrete Finish Work (Tie-Ends, Supporting Structures	12	5/1/24 – 7/31/24
	Appurtenances, Gates, Structures – During Trenching and Periodically During Dry-Downs	12	5/1/24 – 7/31/24
On-Farm	**Components (Concurrent)**		
3	On-Farm Component – Assessment and Planning	4	10/1/24 – 2/1/25
	Assessment of Current Conditions (Water, Soil, Grade, Elevation, Delivery Systems/Structures)		
	Impact(s) on Existing System from Canal Lining		
	Possible Solutions/Projects with EQIP		
4	NRCS/Farmers EQIP grant application	8	2/1/25 – 3/31/25
	Assist farmers with application process, provide documentation and support.		
	Project Closeout	16	4/1/25 – 7/31/25

6. Collaboration

Please describe how the project promotes and encourages collaboration.
Although our district is small and rural which puts us at a disadvantage in competing for larger grants; this also makes us a close-knit community. We must work together to survive. Our local office serves as a nexus for our operations. Our Board members and growers are very active in our planning efforts. They want the most for their funding contributions, and they have a wish list for their and their children's future.

- **Is there widespread support for the project? Please provide specific details regarding any support and/or partners involved in the project. What is the extent of their involvement in the process?**

Yes, the project demonstrates collaboration between our water district and our agricultural users. It can be used as an example to other water managers reflecting on how assessment, planning, usage, need, and corrective measures can be achieved to benefit a district. Even though the costs for modernizing irrigation systems can be cost prohibitive, we demonstrate that we can slowly upgrade and replace our conveyance system and appurtenances, a few at a time and line our canals and laterals in sections, one half-mile at a time. Our water users are very supportive of any funding we receive to help improve our system. They actively participate in our water conservation methods because it is not only good for our water resources, but it also provides them a cost savings, especially with labor costs increasing.

- **What is the significance of the collaboration/support?**

Without the collaborative support of our community, we would not be able to implement our Water Conservation Plan and the improvements needed to better manage and reduce water use. Our partnership is demonstrated in several ways:

a. Voluntary seasonal fallowing program.
b. Irrigation methods that promote water use reduction (sprinklers, drip, etc.)
c. Crops that require less water.
d. Helping fund O & M costs (Percent of fallowing and $25/acre.)
e. Strategies/support/approval for proposals/grants that require matching funds.
f. Creating a mutually beneficial partnership that improves efficiency and reduces costs.
g. Creating the framework for addressing and responding to incidents (ranging from routine to emergencies).

- **Will this project increase the possibility/likelihood of future water conservation improvements by other water users?**

Yes, NCRS currently uses our district to demonstrate projects to others. These include both district and grower activities. We also work with Arizona Western College and participate in their symposiums as well as other agency workshops and meetings. We also work closely with the Quechan Tribe and collaborate with them for their irrigation infrastructure grant applications.

- **Please attach any relevant supporting documents (e.g., letters of support or memorandum of understanding).**

Letters of support are included in the appendix.

7. Additional Non-Federal Funding

State the percentage of non-Federal funding provided using the following calculation:

$576,979.54
$1,076,979.54

8. Nexus to Reclamation

Describe the nexus between the proposed project and a Reclamation project or Reclamation activity.

- **Does the applicant have a water service, repayment, or operations and maintenance (O&M) contract with Reclamation? Will the proposed work benefit a Reclamation project area or activity? Is the applicant a Tribe?**

This project will be performed on a **BOR asset** (Bard Irrigation District - Cocopah Canal) that is operated and managed by the Bard Water District under contract number **19-XX-30-N0965**. It includes both the Fort Yuma Indian Reservation Indian Unit and Bard Water District (7,600 and 7,100 Acres, respectively). BWD maintains a continuous working relationship with the Bureau of Reclamation's office in Yuma as well as USBR's Technical Service Center and receives Reclamation project water via the All-American Canal. The BWD manages Colorado River water and the irrigation systems for the **BOR asset** (Bard Irrigation Unit and Indian Irrigation Unit). See Appendix for BWD Description, Background, and History. The water conserved through this project will go to lower priority users who are more affected by water shortages. USBR can use this water to aid other growers, municipalities, or other nearby entities. This will be especially important during times of shortages and drought.

1.4 Performance Measures

Pre-project Estimation of Baseline Data:
We have already completed the following tests that are included in our Water Conservation Plan.
Ponding Tests: Seepage and Evaporation

Inflow/Outflow Testing: data is collected whenever water is released. This is incorporated into our data base. We can generate report for early and late seasons adding the ratio of acre-feet diverted to acre-feet received to calculate efficiency. Adjustments are made for evaporation (including season/ambient temperatures).

Post-Project Methods for Quantifying Benefits of Canal Lining:
Pre-project results will be compared with Post-project results to calculate water savings. We will compare ratio of acre-feet diverted to acre-feet received to calculate efficiency. These stats will be updated in our Water Conservation Plan. This data will be provided in our SOR plan.

2. Project Budget

2.1 Funding Plan and Letters of Commitment

The **Federal share** is **46%** and the **Non-Federal** share is **54%**.

BWD In-kind Contributions: Salaries/Fringe, Equipment, Indirect Costs
We will utilize our staff and heavy equipment for all project activities, including specific Tasks and Milestones. This will include Project Management, engineering, on-site excavation, demolition, and installation. Costs will be greatly reduced using BWD staff and equipment.

Bard Cash Contribution: Remaining construction costs.

Costs incurred before start date: $0.00

2.2 Budget Proposal

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal funding	$500,000.00
Costs to be paid by the Applicant	$576,979.54
Value of third-party contributions	$0.00
TOTAL PROJECT COSTS	**$1,076,979.54**

Project Costs Breakdown:
Federal Funding

BUDGET ITEM DESCRIPTION	AMOUNT
Materials	$84,000.00
Construction	$416,000.00
TOTAL FEDERAL FUNDING	**$500,000.00**

Non-Federal Funding – In Kind and Cash

BUDGET ITEM DESCRIPTION	AMOUNT
Salaries and Wages*: In Kind*	$80,548.40
Fringe: *In Kind*	$42,831.14
Travel:	$0.00
Equipment: *In Kind*	$155,600.00
Materials and Supplies:	$0.00
Contractual/Construction:	$298,000.00
Other: Environmental Compliance & Engineering	$0.00
In Direct Costs – De Minimis In-Kind	$0.00
TOTAL NON-FEDERAL FUNDING	**$576.979.54**

BUDGET ITEM DESCRIPTION	COMPUTATION		Quantity TYPE	TOTAL COST
	$/Unit	Quantity		
SALARIES/WAGES				
Project Manager	$43.43	360	HR	$15,634.80
Water Master	$27.56	360	HR	$9,921.60
Equipment Operators (2)	$23.02	800	HR	$18,416.00
Concrete Fabricator	$20.69	360	HR	$7,448.40
Gate Fabricator	$20.69	360	HR	$7,448.40
Laborers (2)	$13.52	720	HR	$9,734.40
Administrative Assistant	$24.54	120	HR	$2,944.80
Contract and Grants Specialist	$25.00	360	HR	$9,000.00
			Subtotal	$80,548.40
FRINGE BENEFITS				
Project Manager	$15,634.80	.4534	%	$7,088.82
Water Master	$9,921.60	.4383	%	$4,348.64
Equipment Operators (2)	$18,416.00	.5891	%	$10,848.87
Concrete Fabricator	$7,448.40	.5605	%	$4,174.83
Gate Fabricator	$7,448.40	.4997	%	$3,271.96
Laborers (2)	$9,734.40	.5533	%	$5,386.04
Administrative Assistant	$2,944.80	.4694	%	$1,382.28
Contracts and Grants Specialist	$9,000.00	.7033	%	$6,329.70
			Subtotal	$42,831.14
EQUIPMENT (Bard Water District)				
Front End Loader CAT 938G	$100.00	160	HR	$16,000.00
Rubber Tired Excavator CAT M318F	$100.00	120	HR	$12,000.00
Excavator 330 C	$100.00	120	HR	$12,000.00
Dump Truck GMC	$100.00	160	HR	$16,000.00
Dump Truck Kenworth	$135.00	160	HR	$21,600.00

Water Truck – GMC	$50.00	120	HR	$6,000.00
12M3 Motor Grader	$150.00	160	HR	$24,000.00
Mac/Cozad Lowboy	$150.00	120	HR	$18,000.00
Flatbed/Tilt Truck	$75.00	120	HR	$9,000.00
Service Truck 1 Ton 2000 Ford	$50.00	240	HR	$12,000.00
Project Manager and Water Master Trucks (2)	$25.00	360	HR	$9,000.00
			Subtotal	$155,600.00
SUPPLIES AND MATERIALS				
Fill Dirt	$12.00	7,000	CU YD	$84,000
Concrete included with Trencher	$0.00	600	CU YD	$0.00
			Subtotal	$84,000.00
CONTRACTUAL/CONSTRUCTION				
Construction Management Included On-Site Engineering/Survey	$62,400.00	1	LS	$62,400.00
Concrete Testing	$18,000.00	0.5	Mile	$18,000.00
Trencher	$240.00	2,640	LF	$633,600.00
			Subtotal	$714,000.00
OTHER				
Environmental and Regulatory Compliance	$0.00	1	LS	$0.00
			Subtotal	$0.00
TOTAL DIRECT COSTS	**$1,076,979.54**			
INDIRECT COSTS				
De minimis	0%		base	$0.00
TOTAL ESTIMATED PROJECT COSTS	**$1,076,979.54**			

2.3 Budget Narrative

Salaries and Wages:

Project Manager – Nick Bahr, General Manager
Manage Overall Project: Bid Procurement Process; Scheduling of Staff and Equipment.

Water Master – Shawn Weddle
Assist Project Manager – Help supervise BWD employees and Alert/Coordinate with Water Users

EQ Operators – 2

Initial site preparation – some excavation and demolition activity, provide support for all construction activities including logistics

Laborers – 2
Assist with all construction activities

Gate Fabricator
On-site installation and modifications

Contracts & Grant Specialist – Lydia Mendoza
Contract Administration, Tracking, Quarterly and Final Reports

Administrative Assistant – Maria Alonso
Purchasing, Payroll. Tracking, Equipment/Staff Hours for Tracking

Fringe: Fixed
The Bard Water District certifies that the labor and fringe rates included in the budget proposal represent the actual labor rates of the identified personnel.

Travel: No Travel Required

Equipment: Will use Bard equipment (Bard Schedule) Site preparation, load and transport dirt, Earthwork, Installation/rebuild structures, and final clean-up. Dust control.
Vehicles used for project management and in support of on-site Bard crew.

Motor grader 12M3
CAT 938G
CAT 420 F Backhoe
Tracked Excavator 330C
Rubber Tired Excavator 318F
Dump Truck
International Water Truck
Mac/Cozad Lowboy
Flatbed/Tilt bed
Ford F150 Pickup Trucks (2)
Ford F150 Crew Cab Truck
Ford XLT Super Crew
730 & 830 Capital Trapezoid Trencher with Boat (Slipform for concrete) provided by Crawford Associates **(Contractor)**

Used as needed:
Lighting (Night)
TIG Welder
Tamper
Stihl Concrete Saw
ARC Welder
Roller
730 & 830 Capital Trapezoid Trencher with Boat (Slipform for concrete) provided by Crawford Associates **(Contractor)**

Materials and Supplies:
Concrete for appurtenances (Aprons, Tie-Ends, Frame, Sidewalls, etc.)
Fill dirt to bring to fill trapezoid at required slope/grade
Forms/Traverse Joints/Structures for Concrete work NC

Safety: Barriers/Temporary Fencing, Level D Personal Vests, glasses, hard hats, gloves; Drinking Water; Shade Provided by BWD at **no** costs.

Contractual:
Engineering and Design – George Cairo Engineering LLC
Trencher

Environmental Regulatory Compliance Costs:
None – HAER completed July 2021

Indirect Costs
0% de minimis of overall sub-total.

3. Environmental and Cultural Resources Compliance

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

BWD's Mohave Lining Project will have no significant impact to the surrounding environment. All earth-disturbing work will occur with existing canal and sidewalls.

- **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?**

As this area is greatly disturbed and in constant agricultural use, there are no threatened or endangered species or critical habitat present.

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

There are no wetlands within the project boundary.

- **When was the water delivery system constructed?**

The Mohave Canal was constructed as part of the original 1909 Yuma Project.

- **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.**

Yes, this project will result in upgrades to several turnouts, checks, or road crossings to tie them into the new 0.5 Mile of Mohave Canal concrete lining. These upgrades can include modifying, rebuilding, or replacing some components of a structure to maximize water efficiency.

- **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.**

The features in the Bard Water District Listed or Eligible for Listed on the National Register of Historic Places include: The All- American Canal, USBR Dams, Head Gates, and Retention Areas, Old Southern Pacific Rail Line and Bridges, Fort Yuma, Potholes, and Petroglyphs. None of these will be impacted by this project.

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

There are no archaeological sites in the project area.

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

This project will not have disproportionally high or adverse effects on low income or minority populations. This project will positively affect these populations.

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

The project will not limit access to and ceremonial use of sacred sites or impact Tribal lands.

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

No, this project will have the opposite effect, reducing noxious weeds and non-native invasive species.

4. Required Permits or Approvals

There are no permits or approval required for this project beyond of Reclamation's requirements.

5. Letters of Project Support

Please see attachment for Letters of Support on this project. Letters of support from:

- Various Local Farmers

6. Official Resolution

An official resolution approved by the Bard Water Irrigation and Drainage District will be submitted within 30 days. There is no third-party financial support.

7. Overlap or Duplication of Efforts Statements

Bard Water District does not have any projects which overlap between the proposed project nor any other active or anticipated proposal or projects in terms of activities, costs, or commitment of key personnel. The submitted proposal from BWD is not in any way duplicative of any proposal or project that has been or will be submitted for funding consideration to any other potential funding source.

8. Conflict of Interest Disclosure

Bard Water District does not have any existing conflicts of interest, nor do we anticipate having any conflict of interest during the Federal award period.

9. Uniform Audit Reporting Statement

To date, the Bard Water District has not received $750,000 in U.S. dollars or more in Federal grant award funds during a single fiscal year.

10. Certification Regarding Lobbying

Bard Water District certifies no current lobbying activities. Please see the completed SF-LLL Form.

11. Appendices

Appendix A: BWD Background
Appendix B: Letters of Project Support
Appendix C: Photos and Maps of Project Area
Appendix D: Official Resolution (Submit within 30 days)

Appendices

Appendix A

Description, Background and History of the Bard Water District

The Yuma Project, initiated in 1909, is a Federal Reclamation Project and lies within the historical boundaries of the Fort Yuma Indian Reservation in Southeastern California (Imperial County) along the lower Colorado River near Yuma, Arizona. The Bard Water District and Lands located in the Yuma Project includes the Valley Division in Arizona and the Reservation Division in California. The Reservation Division consists of approximately 14,700 irrigable acres of which 7,100 acres are in the Bard Unit (Bard Water District, mostly on the Eastern portion) and 7,600 acres in the Indian Unit (mostly on the Western portion).

On December 1, 1978, the Bard Irrigation District was renamed the Bard Water District. In March 1981, the Bard Water District entered a contract with the U.S. Bureau of Reclamation (USBR) for the operation and maintenance of the Bard Unit, In January 1983, BWD entered an additional contract to operate and maintain the Indian Unit facilities. The Indian Unit Water Users pay the Bureau of Indian Affairs (BIA) their O & M costs, then these funds pass through to the USBR and eventually BWD is compensated. *The overall condition of the delivery and drainage systems is relatively poor due to aging infrastructure , flood damage, maintenance challenges and other causes,* USBR TM 86-68210-2016-07, Evaluation of O & M Costs Allocation, July 2016.

The Fort Yuma Indian Reservation of California was established for the Quechan Indian Tribe by an Executive Order of January 9, 1884. These Indian lands are held in trust by the BIA for the individual Indian allottees in about 10-acre allotments. This acreage is pooled and leased to approximately 10 major farm operators in the area. The leases are administered by the Bureau of Indian Affairs. The Bard Unit contains patented lands held in private ownership. There are about 190 individual water user accounts in the Bard Water District and 10 in the Indian Unit.

Work began on the distribution system of the Reservation Division in 1909 and the patented land was opened to settlers in 1910. With the construction of the Laguna Dam from 1905-1909, approximately 38,000-acre feet per year were provided to the non-Indian sections. The Bard Irrigation District was organized in 1927 to represent landowners in the Bard District. Water for the project was diverted from the Laguna Dam.

Description, Background and History of the Bard Water District

Later after the construction of the Imperial Diversion Dam (1938), 5 miles upriver and the completion of the All-American Canal (1941), irrigation for the Reservation Division was diverted from 5 turnouts along the All-American Canal. This included the Siphon Drop Power Plant for additional turnouts off the Yuma Main Canal for the Valley Division located in Arizona.

The Bard water users originally contracted (beginning in 1909) with the Bureau of Reclamation under Present Perfected Rights to provide water under this pre-existing agreement. Bard's consumption is based upon these farm units. The Yuma Project Reservation District (YRPD) can divert all the water needed for crops; not to exceed 25,000 acres per year. The Bard Water District is just below the Laguna Dam, the first dam built on the Colorado River to divert water for the Yuma Project.

The Bard Unit is part of the Yuma Project Reservation Division and has 2nd Priority Water under the California Seven Party Agreement. Return water flows back into the Colorado River and continues to Mexico as specified by the International Agreement. The most important crops grown in the Bard Water District are produce, Medjool dates, citrus, cotton, alfalfa hay, and wheat. Crops can be grown year-round in this warm dry climate with little need for frost protection.

Currently, the Bard Water District operates and maintains 67 miles (353,760 Linear Feet) of irrigation ditches and canals; only 30% are lined with concrete or concrete piping. YPRD diverts approximately 90,000-acre feet per year to irrigate approximately 15,000 acres. Efforts to conserve water are challenging in Bard's antiquated system, but Bard works closely with its Water Users, USBR and other agencies to be pro-active in addressing these issues.

Description, Background and History of the Bard Water District

Source of Water Supply:
Colorado River ➡ All American Canal ➡ Canals ➡ Laterals

Total Quantity of Water Supplied: Bard Unit: 50,000-acre ft/yr. Indian Unit: 49,000-acre ft./yr.

Current Users and Number Served: 217 Water Users (Farmers and Producers)

Current Water Demand: 17 cfs **Projected Water Demand:** 17 cfs

Estimated Water Loss Reduction if New pipeline installed: 120 – 200-acre feet/year

Major Crops: Wheat, Sudan Grass, Produce and Cotton (Listed by water demand: High ➡ Low

Total Acres Served: Approximately 15,000

Potential Shortfalls in Water Supply: If drought continues, quantities could be reduced. Increased demand from new users. Water conservation measures are critical. Farmers here have already been encouraged to implement seasonal fallowing, use drip irrigation methods, eliminate crops that require large quantities of water (i.e., wheat or Sudan grass – Estimated total of 16-acre feet (48 hours @ 4-6 intervals).

Bard Water District Water Delivery or Distribution System: Agricultural Use only.

Type and Approximate Total Lengths of Canals, Laterals and Pipes: 67 Miles 353,760 LF
Concrete Lined/Pipe: 26 Miles 137,280 LF (39%) **Unlined:** 41 Miles or 216,480 LF (61%)

Type and Approximate Total Lengths of Canals:			13 Miles	68,640 LF
Concrete Lined:	8 Miles	42,240 LF	**Unlined:**	5 Miles	26,400 LF
Type and Approximate Total Lengths of Laterals:			50 Miles	264,000 LF
Concrete Lined:	12 Miles	63,360 LF	**Unlined:**	36 Miles	190,080 LF
Fragmented/Deteriorated Concrete Lined Lateral:			1 Mile	5,280 LF
Type and Approximate Total Lengths of Pipes:			3 Miles	15,840 LF

Number of Irrigation Turnouts: 450

Significant Irrigation Improvements: Automated Controls Structures: 2 SCADA: 0
Remote Monitoring Devices: 7

Other: 3 Ram type Cipolletti weirs, 2 Long-throated flumes.

Top Flavor Farms
P.O. Box 2784
Yuma, AZ 85366

10/28/2021

Arlene Kingery
Contracts & Grants Specialist
Bard Water District
1473 Ross Road
Winterhaven, CA 92283

Subject: Letter of support for Bard Water District's Agricultural Water Use Efficiency Grant Application FY2021-2022 to Finish Lining 0.5 Mile (1/3) of the Remaining 1.5 Mile Upper Section of the Mohave Canal

Dear Arlene,
We are pleased to provide this letter of support to Bard Water District for this grant application. We supported Bard Water during Project 1: The Concrete Lining of the lower 1.28 Mile section by fallowing our fields that receive water from the Mohave Canal. The concrete lining of the Mohave Canal will create new opportunities for us to adapt and improve our own irrigation systems. NCRS has already contacted us about potential project and funding. These project improvements would help us optimize efficiency, reliability, and safety of our water delivery systems, subsequently improving water management and conservation. This will also reduce the risk of bacterial contamination from the sludge on the bottom of the existing earthen canal sections of the Mohave Canal and reduce noxious/invasive plants. The Mohave Canal currently irrigates 221.73 acres of our agricultural fields. We are very pleased with the concrete lining of almost half of the canal and will continue to support Bard in their efforts to improve our water delivery systems.

Sincerely,

Steve Alameda
President, Top Flavor Farms

10/28/2021

Arlene Kingery
Contracts & Grants Specialist
Bard Water District
1473 Ross Road
Winterhaven, CA 92283

Subject: Letter of support for Bard Water District's Agricultural Water Use Efficiency Grant Application FY2021-2022 to Finish Lining 0.5 Mile (1/3) of the Remaining 1.5 Mile Upper Section of the Mohave Canal

Dear Arlene,

We are pleased to provide this letter of support to Bard Water District for this grant application. We supported Bard Water during Project 1: The Concrete Lining of the lower 1.28 Mile section by fallowing our fields that receive water from the Mohave Canal. We realize that modernization of infrastructure (concrete lining) will provide us new opportunities for us to adapt and improve our irrigation systems also. NCRS has already contacted us about potential project and funding. These project improvements would help us optimize efficiency, reliability, and safety of our water delivery systems, subsequently improving water management and conservation. This will also reduce the spread of noxious/invasive plants. The Mohave Canal currently irrigates 682.4 acres of our agricultural fields. We are very pleased with the concrete lining of almost half of the canal and will continue to support Bard in their efforts to improve our water delivery systems.

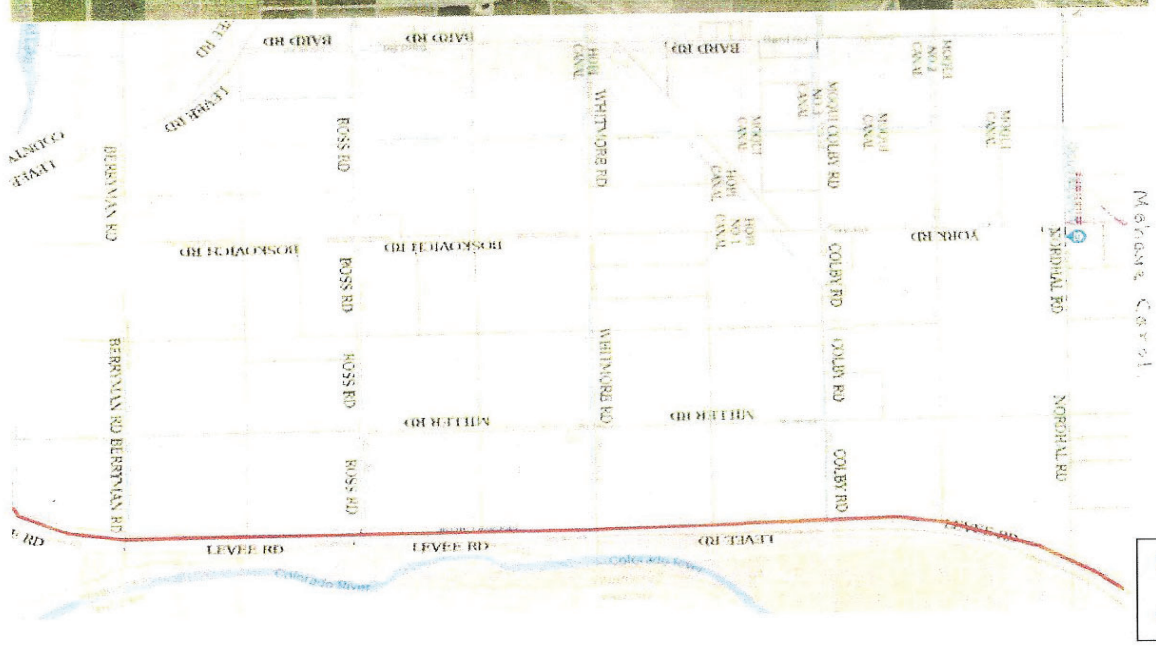
Sincerely,

William Harrison

Harrison Family Farms Partnership

6445 East County 3rd Street | Yuma, AZ 85365 | Phone 928-344-0885 | Fax 928-726-1176 | abrooks@harrisonfarmsinc.com


Mohave
Canal Head


Mohave
Canal Head

Photographs

Four Structures (Check and Turnout) - Start and End of Each 0.5 Miles Section

Metal Slide Gate
with Jacklift Device
Type A
Rectangular
Sidewall connects
to Road Crossing
upstream and
Check Structure
downstream.
Proposed to be replaced with road crossing.

Photo 16
Kawai Lateral Head Gate/Turnout

Wooden Slide Gate, Lever and Headwall Replaced (Post 1992)
West side of Canal - Facing West
32°47'21.12"N 114°32'3.42"W
ASM Feature No.4-IMP-6816 (YIP Y6)

Kawai Head Gate

Two Adjacent Wooden
Slide Gates with narrow
wooden handles for
lifting.
Type B Flat
Concrete sidewalls
extend on East and West
sides of canal.
Metal Grate Pedestrian
Walkway
Proposed to be replaced with turnout and road

Photo 17

Kawai Check Structure (1949-1950)

Facing South/Downstream
32°47'21.04"N 114°32'3.34"W