Main Canal
Water Efficiency Improvement Project

WaterSMART: Water and Energy Efficiency Grants for FY 2023
No. R23AS00008
Funding Group II

Prepared For:
Bureau of Reclamation
Financial Assistance Support Section
Attn: Water and Energy Efficiency NOFO
P.O. Box 25007, MS 84-27133
Denver, CO 80225
SHA-DRO-FAFOA@usbr.gov
303-445-2906

Submitted By:
Turlock Irrigation District
333 E Canal Dr
Turlock, CA 95380
Phil Govea, Civil Eng. Dept. Manager
pdgovea@tid.org
(209) 883-3447

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SECTION 1: TECHNICAL PROPOSAL AND EVALUATION CRITERIA

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Executive Summary

Date: July 28, 2022	**Applicant Name**: Turlock Irrigation District
City: Turlock	**Project Length of Time:** 27 months
County: Stanislaus	**Estimated Completion Date:** Feb. 2026
State: California	**Located on a Federal Facility:** No

Located in the heart of the drought-stricken Central Valley, the Turlock Irrigation District (TID) is California's very first irrigation district. TID now serves more than 4,500 irrigation customers and owns and maintains a gravity-flow system of more than 250 miles of canals and laterals, including its Main Canal (MC) that is used to generate power at the Turlock Lake and Hickman hydropower plants. Virtually all irrigation deliveries in TID are supplied from Turlock Lake, a balancing reservoir that TID uses to store surface water before it is released into the lower conveyance system (conveyance system, or system). The MC is located directly downstream of Turlock Lake and conveys all surface water inflows to TID's major canals (Ceres Main, Turlock Main, and Highline) and the many laterals branching from those canals. Operation of the MC thus serves a critical role in regulating water levels and surface water inflows at the upstream end of the conveyance system. The water levels and flows in the MC are currently regulated manually by control structures ("drop structures") located strategically along the length of the MC. When flow adjustments are required, operators must now travel to each of the structures to manually adjust the gates - a very labor-intensive and time-consuming endeavor. As a result, flow changes in the MC are currently limited to once every 24 hours, despite constantly changing flow conditions and demands downstream. These existing procedures result in significant loss of water, operational challenges and inefficiencies throughout the downstream canals and laterals. The proposed Project ("Project") will automate five (5) drop structures on the MC to allow operators to remotely control water levels instead of through manual adjustments, thus allowing multiple changes daily. These drop structures will be structurally modified, existing gates will be replaced with a combination of Rubicon Flume Gates and actuated aluminum slide gates, and telemetry and communications equipment will be installed for SCADA integration. The Project will allow TID to manage irrigation water more efficiently and give operators greater flexibility in water scheduling; reduce staff workload; allow faster system response to desired changes; and reduce water losses. Modifying the MC drops will improve service flexibility to TID laterals and irrigation customers. The new gates will help reduce flow rate excesses, deficits, and fluctuations by maintaining steadier water level elevations. The structure improvements will also allow flow changes made at the head of the

MC to travel though the conveyance system more quickly without altering delivery flows. These improvements will result in more reliable and consistent deliveries and will promote greater utilization of any basins or reservoirs constructed downstream in the conveyance system.

In doing so, the Project is expected to directly conserve an average of approximately **2,000 acre-feet per year (AFY)** of surface water that has historically spilled from TID's major canals due to flow overages and fluctuations that would be controlled and reduced by operation of the Project. The Project is also expected to reduce groundwater pumping (currently necessary for carryover between flow changes each day) by approximately **241 AFY** which will result in an estimated annual energy savings of **42,000 kWh**. The Project will also provide 4,200 kWh of renewable energy and reduce carbon dioxide emissions by 1,457,468 grams per year. The preliminary cost to construct the Project improvements has been estimated at $3.9 million. **This project is shovel ready** as engineered plans were competed in December 2021 and CEQA clearance is complete (State Clearinghouse #2022070286). Also, construction is expected to begin November 2023. TID is a Category 'A' applicant.

Project Location

Provide specific information on the proposed project location or project area including a map showing the geographic location.

The project consists of improvements at the MC of the TID system, located in Stanislaus County, California. The MC is located south of the Tuolumne River and carries water from Turlock Lake to just south of the township of Hickman. The project improvements consist of construction at five of its canal drops located as follows:

- MC Drop 4 is at 37 degrees 37'31.3" North by 120 degrees 38'59.7" West
- MC Drop 5 is at 37 degrees 37'50.6" North by 120 degrees 39'27.9" West
- MC Drop 6 is at 37 degrees 37'47.4" North by 120 degrees 41'23.4" West
- MC Drop 7 is at 37 degrees 37'32.5" North by 120 degrees 41'59.3" West
- MC Drop 8 is at 37 degrees 37'49.1" North by 120 degrees 44'15.4" West

Below is a vicinity map showing the location of these drops on the MC.

Figure 1. Project Locations

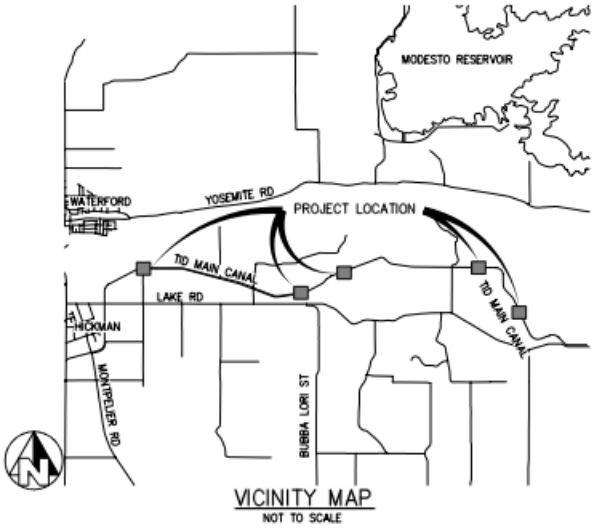


Figure 2. Improvement Locations

Technical Project Description

The proposed Project will automate five canal water level control structures ("drop structures") by replacing existing radial gates with Rubicon Flume Gates and replacing existing harp gates and board bays with remotely actuated slide gates. The Hickman Spill, which is part of the five drop structures, will also be automated for flow control by replacing the existing wooden radial gate with a Rubicon Flume Gate. Water level sensors and telemetry equipment will also be installed for Supervisory Control and Data Acquisition (SCADA) integration.

As noted above, the Project proposes to remove and replace existing radial gates with automated Rubicon Flume Gates. The District has had great success with these gates and selects them over other types of automated gates due to the number of functions available and the system integration potential, which provide superior water system efficiency improvements. The District is in the process of automating all of the lateral headgates in its canal system with Rubicon Flume Gates, which can then be tied together with this project to create superior irrigation control and efficiency.

To minimize construction costs, the Project proposes to install new Flume Gates and slide gates in existing bays of the control structures. During normal canal operation, the new slide gates installed will be remotely adjusted to the anticipated water flow for each day such that the Rubicon Flume Gates in each drop structure are operating at 50% capacity. Then as demand fluctuates during the day, the Rubicon Flume Gates will adjust automatically up and down to supply the required flow without additional commands from operators. These gates will still function during power outages because they will have internal batteries.

1. The Project will include the construction of the following components necessary to automate the existing drop structures: Reinforced concrete structure modifications: The existing structures will need to be modified in a limited fashion to accommodate the new Rubicon Flume Gates and remotely actuated slide gates.
2. Installation of Rubicon Flume Gates: Rubicon Flume Gates are a combined flow measurement and control gate designed for open canal applications. The device has flow measurement, water level monitoring, motor control and radio telecommunications integrated into it. The Gate automatically controls the flow of water by varying the gate position based on a preset flow or water elevation. This project will utilize models FGB-1675-3038 at Drop 4 and Drop 8, FGB-2132-3038 at Drop 5 and Drop 7, and FGB-2268-3038 at Drop 6.
3. Installation of actuated aluminum undershot slide gates
4. Installation of galvanized steel access walkways
5. Integration of the new gates with TID's existing SCADA system: SCADA integration will facilitate real-time, automated reporting of water levels and flows to Water Distribution Operators (WDOs) on their tablets, supporting optimal operation of the conveyance system.

TID has completed the Project plans for the above-described work and will construct the Project using an outside contractor.

Evaluation Criteria

Evaluation Criterion A-Quantifiable Water Savings (28 points)

Up to 28 points may be awarded for this criterion. This criterion prioritizes projects that will conserve water and improve water use efficiency, supporting the goals of E.O. 14008. Points will be allocated based on the quantifiable water savings expected as a result of the project. Points will be allocated to give greater consideration to projects that are expected to result in more significant water savings.

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)*

   The Project is conservatively estimated to save approximately 2,000 AFY, on average, of surface water that has historically spilled from TID's major canals due to flow overages and fluctuations that would be controlled and reduced by operation of the Project. Some water saved by this Project would be used to support deliveries and enhance surface water supply availability, especially during prolonged drought, offsetting demand for groundwater pumping downstream of the Project. Some water savings would also reduce surface water diversions, retaining that water in other TID storage facilities, like Don Pedro Reservoir, and

allowing that water to be used later for other beneficial purposes. These water savings translate to an average reduction of 2,000 AFY of surface water diversions and 241 AFY in groundwater pumping needed each year, providing this magnitude of benefit to support TID's water efficiency and drought resilience.

These water savings estimates are quantified based on the methodology recommended in the Agricultural Water Management Council (AWMC) guidelines prepared for the CALFED Bay Delta Water Use Efficiency program (AWMC, 2007)[1], described in greater detail later in this section and in Appendix D. These water savings estimate conservatively consider only spillage during the irrigation season from the three major canals directly downstream of the MC: Ceres Main, Turlock Main (via Hodges Spill), and Highline Canal. Once constructed, the project may also provide additional water savings benefits outside the irrigation season by improving control and monitoring of off-season conveyance system inflows. Depending on how the Project changes operational practices, the Project is likely to also provide substantial water savings benefits by conserving spillage from laterals further downstream in the system. By allowing more frequent changes to system inflows through the MC in response to changing demands, the Project could allow TID staff to significantly reduce overage flows (i.e., flows in excess of deliveries that have historically been required to ensure that sufficient surface water is supplied to irrigation customers) and conserve that water for other uses. Overage flows are estimated to cause 30-40% of the total spillage from TID's laterals, representing more than 10,000 AFY during typical years. A substantial portion of that water could be saved by the Project.

The TID Draft Irrigation Facilities Master Plan (Appendix 2.H. '*Automation of Drops on Main Canals*') also included a preliminary analysis of estimated reductions in groundwater pumping and projected as a water savings benefit of the Project, period, based on operations during the 2017 irrigation season. This analysis indicated that initial automation of MC would result in an estimated rented pumping reduction of 241 acre-feet in groundwater pumping directly by TID in order to make irrigation deliveries downstream of the Project, with an associated costs reduction of $4,400 per year.

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

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

With the current manually-operated MC flow control structures, approximately 2,000 AFY of surface water is being lost at the bottom end of the irrigation system due to flow

[1] Agricultural Water Management Council, 2007. Spillage Reduction Monitoring and Verification, August 2007.

overages and fluctuations. These surface water losses are spilled from the Ceres Main, Turlock Main (via Hodges Spill), and Highline Canals into adjacent streams and drains.

b. 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 current water losses enter drains and waterways and are not returned to the TID conveyance system for beneficial uses within the TID irrigation service area. The uses of this water outside TID are not known.

c. 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?

There are no known benefits associated with TID's current system losses.

2. *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.*

The estimated 2,000 AFY water savings benefits of the Project were quantified according to the methodology recommended in the Agricultural Water Management Council (AWMC) guidelines prepared for the CALFED Bay Delta Water Use Efficiency program (AWMC, 2007), and the related verification-based planning methodology developed by Burns, et al. (2000). Appendix D documents the methodology, considerations, supporting calculations, and historical data that were used to quantify the Project water savings benefits. Table 2 provides a summary overview of the data and calculations (from Appendix D) supporting the water savings benefits.

This methodology quantifies spillage reduction by comparing the average "without-project" spillage to the average "with-project" spillage from the canals directly benefitted by the Project. Average "without-project" spillage represents the estimated future spillage that would occur if the Project were not constructed (i.e., baseline spillage during a period representing future operational and hydrologic conditions). Average "with-project" spillage represents the estimated future spillage that would occur (all else the same) after the

Project is constructed. The reduction in spillage quantified by this methodology thus denotes water savings that result from only the effects of the Project.

The estimated water savings benefits from spillage reduction were quantified using historical spillage data measured and recorded at TID's spillage sites during 2010-2020, a recent period that contains both wet (2011 and 2017) and dry years, including a significant multi-year drought (2012-2016). The canal operations during this period are also expected to be representative of future canal operations. Hourly or daily spillage data were available at all spillage sites during this period and will be available to monitor and quantify future project benefits.

The spillage reduction (i.e., water savings) at each spill site benefitted by the Project was estimated based on analyses of historical spill data and typical spillage reductions for a main canal automation and flow control project as identified by AWMC (2007) and Burns, et al. (2000) (30-50% reduction along canals directly benefitted by flow control). Estimated reductions in this analysis (approximately 30% average reduction of spillage from benefitted spill sites) are within this range. It is important to note that TID is currently designing/constructing two regulating reservoir projects that are expected to work synergistically with this Project. The anticipated benefits of those regulating reservoir projects were removed from the baseline "without-project" spillage prior to estimating the benefits of this Project to avoid double-counting.

In this analysis, the Project was conservatively estimated to only reduce spillage during the irrigation season from the three major canals directly downstream of the MC: Ceres Main (Faith Home Spill), Turlock Main (via Hodges Spill), and Highline Canal (Highline Spill). Once constructed, the project may also provide additional water savings benefits outside the irrigation season by improving control and monitoring of off-season conveyance system inflows. Depending on how the Project changes operational practices, the Project is also likely to provide substantial water savings benefits by conserving spillage from laterals further downstream in the system. The spillage reduction benefits outside the irrigation season and along the downstream laterals are less defined at this time and are therefore not included in these calculations. More details regarding the methodology for this calculation are provided in Appendix D.

Table 1. Water Savings Calculation

Summary (Analysis Period)[1]	**Year Type (TID Available Water)[2]**	**AWMC Spillage Reduction Methodology[3]**		
		Without-Project Spillage (AFY)	**With-Project Spillage (AFY)**	**Estimated Water Savings[4] (AFY)**
Average (2010-2020)[1]	All Years	7,200	5,200	**2,000**
	Normal Years	11,200	8,000	3,000
	Dry Years	3,900	2,700	1,000

1 Analysis Period considers spillage only during the irrigation season. The period from 2010-2020 is considered to be representative of a 10-year period containing both wet and dry years and years of significant drought that are expected to provide a realistic estimate of potential Project water savings under future conditions.
2 "Available Water" corresponds to the amount of water available for purchase by TID's irrigation customers. In "normal" years, 48 inches per acre of "available water" are available to TID's customers. In "dry" years when surface water supplies are constrained, less than 48 inches per acre of "available water" are available to customers.
3 Spillage reduction benefits are conservatively estimated only at spill sites on the three major canals directly downstream of the Main Canal and the Project area: Ceres Main (Faith Home), Turlock Main (Hodges Spill), and Highline Canal (Highline Spill).
4 Estimated water savings are rounded to the nearest 1,000 AFY, and thus may not precisely equal the difference between "Without-Project Spillage" and "With-Project Spillage."

3. 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:

Note: This application responds to questions for this type of infrastructure improvement since the Project work will improve existing irrigation conveyance and delivery infrastructure; however, the water losses proposed to be conserved by this Project are not due to seepage, as the canals are cement-lined, but rather from spillage of surface water due to overages and fluctuations in canal flows and resulting inefficiencies that would be controlled and reduced by operation of the Project.

a. 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.

The Project is conservatively estimated to save approximately 2,000 AFY, on average, of surface water that has historically spilled from TID's major canals due to flow overages and fluctuations that would be controlled and reduced by operation of the Project.

The estimated 2,000 AFY water savings benefits of the Project were quantified according to the methodology recommended in the Agricultural Water Management Council (AWMC) guidelines prepared for the CALFED Bay Delta Water Use Efficiency program (AWMC, 2007), and the related verification-based planning methodology developed by Burns, et al. (2000). Appendix D documents the methodology, considerations, supporting calculations, and historical data that were used to quantify the Project water savings benefits. Table 2 provides a summary overview of the data and calculations (from Appendix D) supporting the water savings benefits.

As described in the preceding section, the spillage reduction estimates were quantified by comparing the average "without-project" spillage to the average "with-project" spillage from downstream spill sites expected to directly benefit from operation of the Project (Ceres Main (Faith Home Spill), Turlock Main (via Hodges Spill), and Highline Canal (Highline Spill)). Average "without-project" spillage represents the estimated future spillage that

would occur if the Project were not constructed, while average "with-project" spillage represents the estimated future spillage that would occur (all else the same) after the Project is constructed. The reduction in spillage thus denotes water savings results from only the effects of the Project. All relevant calculations, assumptions, and supporting data are described in the preceding section and in Appendix D.

b. 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/measures from representative sections of canals.

The water losses expected to be conserved by this Project are not due to seepage, as TID's canals are already cement-lined, but rather from spillage of surface water due to overages and fluctuations in canal flows and resulting inefficiencies that would be controlled and reduced by operation of the Project. Nevertheless, while the project is not expected to directly or significantly reduce canal seepage losses, TID staff have conducted ponding and inflow/outflow tests for various portions of the TID conveyance system in the past and are able to conduct similar tests after the Project is constructed, as needed, to quantify additional benefits of the Project.

c. 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)?

The water losses expected to be conserved by this Project are not due to seepage, as TID's canals are already cement-lined, but rather from spillage of surface water due to overages and fluctuations in canal flows and resulting inefficiencies that would be controlled and reduced by operation of the Project. Post-project spillage losses are expected to occur, albeit at significantly lower rates, due to operational fluctuations lower in the conveyance system and during transfers of delivery flows between irrigation customers (i.e., head change spillage). TID's WDOs work hard to operate the conveyance system efficiently and to avoid these water losses wherever and whenever possible. Automation of drops on the MC will support the WDOs in these efforts, helping them to reduce water losses from TID's canals and to conserve surface water supplies.

d. 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?

As noted, this Project will improve existing irrigation conveyance and delivery infrastructure and therefore qualifies under the criteria for this category, however, the water loss

conserved by this Project is not due to seepage, and therefore is not quantified in terms of annual transit loss reductions. That said, the Project is conservatively estimated to save an average of **2,000 AFY** from major canals in the lower conveyance system (Ceres Main, Turlock Main, and Highline Canals) by controlling and reducing overages and fluctuations in flows that cause spillage.

e. How will actual canal loss seepage reductions be verified?

See response above. The water losses expected to be conserved by this Project are not due to seepage, as TID's canals are already cement-lined, but rather from spillage of surface water due to overages and fluctuations in canal flows and resulting inefficiencies that would be controlled and reduced by operation of the Project. The actual water savings from spillage reduction will be quantified using spillage data from TID's existing measurement devices and sophisticated SCADA system. The main method used for verification of the actual water savings benefit is the spillage reduction quantification guidelines prepared by the Agricultural Water Management Council (AWMC) for the CALFED Bay Delta Water Use Efficiency program (AWMC, 2007)[2]. This methodology quantifies spillage reduction by comparing the average "without-project" spillage to the average "with-project" spillage. Average "without-project" spillage represents the estimated future spillage that would occur if the project were not constructed. After the project is implemented, "with-project" spillage will be directly measured and quantified each year at all spill sites, actual water savings benefits can be determined by comparing the two data sets. (See response to Performance Measures section of this application for further detail.).

f. Include a detailed description of the materials being used.

Quantities and installation locations of specific equipment are described in detail in the Technical Project Description, above. Materials include Rubicon Flume Gates, Fresno Valve Aluminum Side Gates, Gate Actuators, upstream water level sensors, automation telemetry and hardware, and water level sensors. Drop modifications will be made with steel reinforced concrete and walkways and other supports will be steel fabricated and hot dip galvanized to resist corrosion.

Evaluation Criterion B-Renewable Energy (20 points)

Up to 20 points may be awarded based on the extent to which the project increase the use of renewable energy or otherwise results in increased energy efficiency and reduced greenhouse gas emissions.

For projects that include constructing or installing renewable energy components, please respond to Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery. If the project does not implement a renewable energy project but will increase

[2] Agricultural Water Management Council, 2007. Spillage Reduction Monitoring and Verification, August 2007.

energy efficiency, please respond to Subcriterion No. B.2.:Increasing Energy Efficiency in Water Management. If the project has separate components that will result in both a renewable energy project and increasing energy efficiency, an applicant may response to both.

Subcriterion No. B.1: Implementing Renewable Energy Projects Related to Water Management and Delivery

Up to 20 points may be awarded for projects that include constructing or installing renewable energy components (e.g., hydroelectric units, solar-electric facilities, wind energy systems, or facilities that otherwise enable the use of renewable energy). Projects such as small-scale solar resulting in minimal energy savings or production will be considered under Subcriterion No. B.2.

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 Project will implement a renewable energy system by installing a solar energy system with battery backup. New Rubicon Flume Gates and slide gates will be installed in existing bays of the control structures. When two Flume Gates are installed in the same structure, one acts as the 'master' gate while the other mimics its position. These gates will use power generated from solar panels that also have battery backup to allow for continuous function when the solar panels are not generating power.

Describe the amount of energy generated: For projects that implement renewable energy systems, state the amount of energy that the system will generate (in kilowatt hours per year). Please provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate. Please explain how the power generated as a result of this project will be used, including any existing or planned agreements and infrastructure.

The solar energy system will produce an estimated 4,200 kWh per year of energy. This estimate assumes ten (10), 140-watt solar panels operating for the average 214 days of the irrigation season for an average of 14 hours per day of daylight.

Describe any other benefits of the renewable energy project: Please describe and provide sufficient detail on any additional benefits expected to result from the renewable energy project, including:

- *How the system will combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions*
- *Expected environmental benefits of the renewable energy system*
- *Any expected reduction in the use of energy currently supplied through a Reclamation project.*
- *Anticipated benefits to other sectors/entities.*
- *Expected water needs, if any, of the system*

The Project proposes to install new gates in MC's control structures that will use solar panels with battery backup. These renewable energy components will result in some energy savings and produce green energy. In doing so, to some degree, the project will reduce greenhouse gas emissions, offset the impacts of climate change and reduce the need for additional pumped water, estimated to be approximately 241 AFY, which will benefit all TID customers.

Subcriterion No. B.2: Increasing Energy Efficiency in Water Management

Up to 10 points may be awarded for projects that address energy demands and reduce greenhouse gas emissions by retrofitting equipment to increase energy efficiency and/or through water conservation improvements that result in reduced pumping or diversions.

Describe any energy efficiencies that are expected to result from implementation of the water conservation or water efficiency project (e.g., reduced pumping):

- *If quantifiable energy savings is expected to result from the project, please provide sufficient details and supporting calculations. If quantifying energy savings, please state the estimated amount in kilowatt hours per year.*

  As mentioned previously, the proposed Project will conserve an estimated **2,000 AFY** by automating five of the water level control (drop) structures on the MC. Since TID's canal system is predominantly gravity fed, the energy savings would result from reduced groundwater pumping. It is expected that the Project will reduce groundwater pumping by an estimated 241 AFY. Additionally, it is estimated that between 2010 and 2020, approximately 174.31 kWh was consumed per AF of groundwater pumped. Therefore, it is expected that with 241 AFY of conserved groundwater usage, there will be an average total energy savings of **42,000 kWh per year**.

- *How will the energy efficiency improvement combat/offset the impacts of climate change, including an expected reduction in greenhouse gas emissions.*

  Groundwater pumping within the TID service area is powered primarily through energy derived from fossil fuels. By implementing the Project, fossil fuel consumption will be reduced by an average of 42,000 kWh per year.

- *If the project will result in reduced pumping, please describe the current pumping requirements and the types of pumps (size) currently being used. How would the proposed project impact the current pumping requirements and energy usage?*

  TID's agricultural customers rely on groundwater pumping when surface water flows are reduced or not available. The District owns and rents a large number of groundwater pumps throughout its irrigation system during dry years to supplement surface supplies. Given California's ongoing drought conditions, and specifically within TID's service area, agricultural producers are having to rely more and more on groundwater pumping primarily

through electric powered wells. The Project will conserve an estimated average of 2,000 AFY of surface water that would otherwise be lost due to operational spills. A portion of this conserved water would be utilized to offset groundwater pumping and its related energy needs.

- *Please indicate whether your energy savings estimate originates from the point of diversion, or whether the estimate is based upon an alternate site of origin.*

  The energy savings estimates from the Project are derived from the reduction of groundwater pumped in the TID services area.

- *Does the calculation include any energy required to treat the water, if applicable?*

  No. TID only provides irrigation water to its customers, which requires no treatment. The energy savings calculations only consider the energy savings from reduced groundwater pumping.

- *Will the project result in reduced vehicle miles driven, in turn reducing greenhouse gas emissions? Please provide supporting details and calculations.*

  Under current conditions, when adjustments to flows on the MC are required, water distribution operators must travel to each of the structures on the MC and manually adjust the gates located there to maintain operational levels. With the automation of these structures, vehicle miles driven by operators will be reduced. This reduction is estimated to be 3,200 vehicle miles driven per year and the EPA's suggestion that for every gallon of gasoline burned, 8,887 grams of carbon dioxide are released.

Table 2. Direct Project Reduction of GHG Emissions

Energy Savings	Value	Unit	Calculation	Source
Annual Mileage	3,200	miles/year		TID average mileage of vehicles used for trips required to manually adjust drop structures
Annual Gallons	164	gallons/year	3,200 miles/year / 21.5 miles/gallon *1.10	EPA- average MPG + 10% for stop-and-go conditions
Energy Saved	1,457,468	g carbon dioxide/year	164 gallons per year * 8,887 grams carbon dioxide per gallon gasoline	EPA

- *Describe any renewable energy components that will result in minimal energy savings/production (e.g., installing small-scale solar as part of a SCADA system).*

  The Project proposes to install new Rubicon Flume Gates and slide gates in existing bays of the control structures that will use solar energy with battery backup so that they will still

function when the solar panels are not producing power. These renewable energy components will result in some energy savings/production.

Evaluation Criterion C-Sustainability l Benefits (20 points)

Up to 20 points may be awarded under this criterion. This criterion prioritizes projects that address a specific water and/or energy sustainability concern(s), including enhancing drought resilience, addressing current and future impacts of climate change, and resolving water related conflicts in the region. In addition, this criterion is focused on the benefits associated with the project, including benefits to Tribes, ecosystem benefits, and other benefits to water and/or energy supply sustainability.

Enhancing drought resiliency: In addition to the separate WaterSMART Environmental Water Resources Projects NOFO, this NOFO places a priority on projects that enhance drought resiliency, through this section and other sections above, consistent with the SECURE Water Act. Please provide information regarding how the project will enhance drought resilience by benefiting the water supply and ecosystem, including the following:

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

As noted in the 2020 TID 2020 Agricultural Water Management Plan (AWMP), TID practices stewardship of surface water and groundwater resource supplies as a strategy to mitigate climate change impacts such as drought. This is evidenced through its comprehensive conjunctive management program, watershed monitoring programs, development of the Tuolumne River Management Plan, and active engagement in Groundwater Sustainability Plan (GSP) development for the Turlock Subbasin, among other efforts. The proposed Project is consistent with the efficient water management practices described in the AWMP and GSP, as it directly benefits the local groundwater basin by conserving local groundwater resources. The water conserved from this project is expected to avoid surface water loss and reduce groundwater pumping, which will help prevent potential increases in salinity and algal production, and reduced oxygen levels during times of drought when wildlife, fisheries, and habitats need the water the most. In this way, **the proposed Project is expected to improve ecological resiliency to climate change.**

Because it is expected to reduce TID's need to pump groundwater from the High-Priority San Joaquin Valley Basin, the proposed project will help to preserve these resources for their sensitive habitat. The San Joaquin Valley Groundwater Basin lies within the San Joaquin River Hydrologic Region (HR)-- an ecologically sensitive habitat, which is home to various species listed under the Federal and State Endangered Species Acts. The Project is expected to conserve an estimated 2,000 AFY, some of which could be used to enhance surface water supply availability for other beneficial purposes, especially during prolonged drought, and to offset demand for groundwater pumping. These water savings benefits

support the goals of the Sustainable Groundwater Management Act (SGMA) to better protect the High-Priority San Joaquin Valley Basin and sensitive habitat of the San Joaquin River hydrologic region that relies on this water for its survival.

- *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).*

  The Project is expected to reduce excess system flows, improve delivery service and flexibility, simplify system operation, reduce surface water loss, and **lower the amount of groundwater pumping** within the Project benefit area. The Project is expected to provide an estimated average of **2,000 AFY** of surface water that would otherwise be lost due to operational spills. As a result of this project, this conserved water would be able to remain in the system for a longer period of time, thus reducing the need for groundwater pumping. This conserved water left at the source would then be available to address other needs in the region.

  The impact on the environment due to recent drought conditions has been tremendous. According to the Pacific Institute, many of the state's environmental flows went unmet during the drought period, affecting aquatic ecosystems and decreased protections for endangered species. The recent drought has caused losses or destruction of fish and wildlife habitat, loss of wetlands, more wildfires and lower water levels in reservoirs, lakes, and ponds. Dry creeks and rivers led 18 fish species to diminish to near extinction. Wildlife that has historically thrived in urban habitats also struggled to adapt as state and local conservation regulations forced California homeowners to let their lawns and gardens dry and die.

  A December 2016 study from The Ecological Society of America stated that declining streamflow and the accompanying rising stream temperatures have immediately threatened the health of ecosystems that rely on water. As noted in its AWMP, TID practices resource stewardship as a strategy to mitigate climate change impacts. TID participates in studies of aquatic life and habitat to better understand potential impacts of climate change. Conserving water resources will have a significant positive impact on preserving the long-term habitats for fish and wildlife by optimizing water management. The conserved water left at the source as a result of this Project could potentially be used to benefit these local ecosystems.

- *Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of a 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).*

Yes, through its efficiencies, the Project will allow TID to conserve an estimated average of **2,000 AFY** of surface water that would otherwise be lost through spillage from TID's major canals due to flow overages and fluctuations. This will allow TID to reduce surface water loss, resulting in reduced groundwater pumping, particularly during times of drought when wildlife, fisheries, and habitats need the water the most. Some of these water savings could be used to enhance surface water supply availability for other beneficial purposes, especially during prolonged drought. Reduction in surface water loss from TID will ultimately benefit the species in the San Joaquin River and Tuolumne River that are home to several endangered species such as the Chinook Salmon and Steelhead Trout; their survival depends on maintaining a sustainable hydrologic system.

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

TID overlies the Turlock Subbasin, a portion of the San Joaquin Valley Basin that is identified as a High-Priority Subbasin by the California Department of Water Resources' Sustainable Groundwater Management Basin Prioritization Model. Across much of the San Joaquin Valley, groundwater resources have historically been over drafted and irrigation districts that overly the basin must reduce groundwater pumping to reduce groundwater level decline, depletion of groundwater storage, and subsidence that is currently threatening local aquifers. The proposed Project directly benefits the local groundwater basin by conserving surface water supplies for local beneficial uses, and by supporting sustainable management of local groundwater resources. It is estimated that implementation of this Project will result in 2,000 AFY of surface water savings that will remain a source benefiting all users, including the local ecological systems.

- *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?*

  Projects that are intended to improve streamflows or aquatic habitat, and that are requesting more than $500,000 or more in Federal funding, must include information about plans to monitor the benefits of the project. Please describe the plan to monitor improved streamflows or aquatic habitat benefits over a five-year period once the project has been completed. Provide detail on the steps to be taken to carry out the plan.

The intent of the proposed Project is, in fact, to **directly result in more efficient management of the water supply**. It is expected **to provide greater flexibility to water managers resulting in a more efficient use of water supplies**.

As early as August 2005, a report was prepared for the TID by the Irrigation Training and Research Center (ITRC), California Polytechnic State University California, which expanded upon a 1997 ITRC Canal Automation Report. This report was entitled, "***Formulating a***

Strategic Modernization Plan for Turlock Irrigation District" and recommended that the district convert various sections of canal into "superhighways" that will permit the watermaster to quickly respond to excess flows into or out of reservoirs without having to ask users to change their delivery flows. In fact, one of the two projects that this document focused on was the converting the MC and Ceres Main Canal into a superhighway between Turlock Lake and the proposed new buffer reservoirs along the Ceres MC. This report also addressed the recommended automation, new hardware and equipment, control strategies, flow rate measurement devices, communications, and integration into the district's SCADA system. The report noted that with the construction of automated check structures along the superhighway, the water master can quickly and safely implement large flow rate changes to the MC inflow, while monitoring the water levels in the reservoirs and flow rates at key points in the system. Water level and flow rate data would be available remotely via TID's sophisticated SCADA system on a real time basis. The proposed Project is a by-product of this report and its recommendation.

Due to persistent drought conditions in the area, the ability to create any additional surface water supplies is extremely significant to TID, and the Central Valley. Canal automation will provide greater operational flexibility by allowing TID to control the release of this supply to maintain a more consistent and reliable irrigation flow downstream.

Addressing a specific water and/or energy sustainability concern(s): Will the project address a specific sustainability concern? Please address the following:

- *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.*

One specific issue in the TID service area that is impacting water sustainability are shortages due to drought and climate change. In the last 25 years, TID has experienced record breaking droughts, floods, and temperature periods compared with the last 100-year record, according to the Climate Change section of the AWMP. According to the U.S. Drought Monitor, (see figure below) Stanislaus County is currently experiencing a D3 "Extreme Drought Area" status, the 2nd highest category on the Drought Monitor and is in the 2022 Drought Emergency Area declared by the Governor of California on March 28, 2022. The current drought began 1/28/2020 as a D1 Moderate drought, continued in progressive severity, and is now a "D3 Extreme Drought Area", characterized as widespread water shortages or restrictions; major crop and pasture losses.

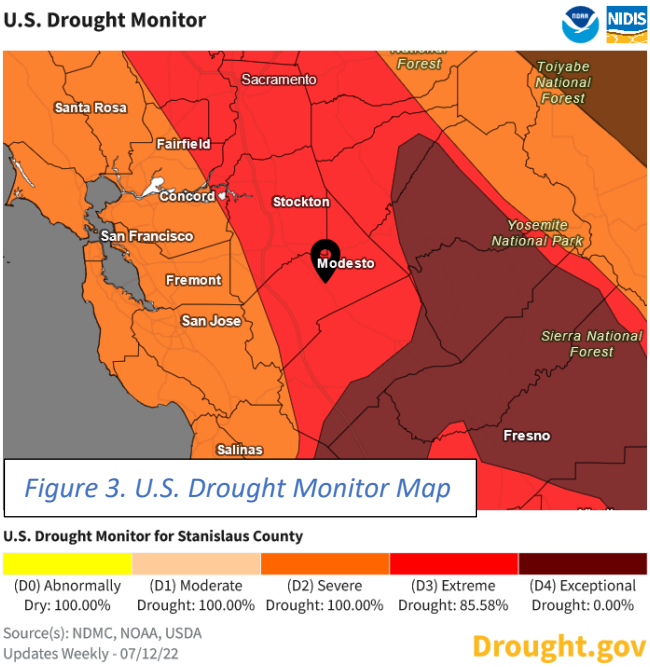


Figure 3. U.S. Drought Monitor Map

The Intergovernmental Panel on Climate Change (IPCC) has concluded that the warming of the climate system is unequivocal, drought is primarily a consequence of natural climate variability. Scientists have added that the likelihood of any drought becoming acute is rising because of climate change and long-duration hydrological drought is increasingly possible before the end of this century. The period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere (IPCC, 2014). California's temperature record reflects global temperature trends. The NOAA Climate Divisional Dataset is a long-term dataset used to generate historical (1895-2016) climate analyses for the contiguous United States. In a recent report covering California, within Climate Division 2 (Sacramento Drainage), the long-term record depicts a dramatic shift in annual average temperature. The three years (2014-2017) are depicted as being some of the warmest and driest years on record.

TID's drought resilience is further impacted by increased groundwater pumping in neighboring areas, which has led to a decline in groundwater levels along TID's eastern boundary over the last few decades. Every drop of surface water that can be conserved in-lieu of groundwater pumping, is critical to achieving and maintaining groundwater sustainability and supporting local drought resilience. The water conserved as a result of implementation of the proposed Project will help this cause.

- *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.*

  There are a variety of issues in the Project area that are impacting energy sustainability, including as impacts resulting from ongoing drought, reliance on fossil fuels and increased pollution.

  Typically, about 15% of California's electricity needs are provided by hydroelectric power (from dams). In 2015, at the peak of the worst drought in California's recorded history, it supplied only 6%. That loss in electricity generation during the 2012-15 drought cost Pacific Gas & Electric (PG&E) and other California utilities about $5.5 billion. As California's climate becomes more prone to severe droughts, utilities and ultimately ratepayers will likely be forced to bear those future costs. Those increased costs underscore two effects of last decade's drought: the decreased supply of relatively inexpensive power and the increased consumer demand for electricity. Consecutive years of below-average Sierra Nevada snowpacks and parched reservoirs resulted in hydroelectric dams operating far less than normal, as high temperatures associated with the drought caused energy use to skyrocket when Californians demanded more energy to combat the high temperatures.

  The lost hydropower is usually made up with the purchase and combustion of additional natural gas. The electricity ratepayers throughout California spent nearly an additional $2 billion to purchase natural gas over the drought period, which resulted in an additional 13 million tons of CO2 emitted into the air— about a 10 percent increase in total annual CO2 emissions from California power plants, thus having a detrimental impact on the state's air quality.

  The proposed Project is estimated to conserve an estimated 241 AFY in groundwater pumping energy consumption, which equates to an average savings of 42,000 kWh energy savings of **per year,** which will help to alleviate some of these issues that are impacting energy sustainability.

- *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?*

  As mentioned above, the extreme and persistent drought that the Central Valley of California has experienced in recent years has resulted in reduced hydroelectric power, costing utility companies and ultimately the residents billions of dollars. The Project is expected to provide multiple benefits that address energy sustainability concerns, particularly reliance on fossil fuels, pollution, and interruptions in service.

The Project is expected to reduce excess system flows, allow faster system response to desired changes, improve delivery service and flexibility, simplify system operation, and lower **the amount of groundwater pumping** within the Project benefit area. The reduction in groundwater pumping will result in a corresponding decrease in TID's reliance on fossil fuels needed for pumping operations and will also reduce the pollution caused by pumping operations. Less reliance on electrical energy by TID will make more available for other users, thus reducing interruptions in service.

By conserving an estimated 241 AFY in groundwater pumping and a corresponding 42,000 kWh energy savings each year, the proposed Project will directly address shortages due to drought and climate change. The Project will support TID's long-term drought resilience by capturing and conserving spillage of surface water for beneficial TID uses; and improve efficiency of the operation of TID's canal system. As a result, the Project helps to provide a more sustainable operation of the underlying groundwater subbasin.

- *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.*

The majority of agricultural producers in TID's irrigation service area rely on a combination of surface water supplemented by groundwater pumping when surface water flows are reduced or not available. Given the ongoing drought conditions in California and specifically the TID's irrigation service area, TID agricultural producers are having to rely more and more on groundwater pumping through primarily electric powered wells. The Project will provide an estimated average of **2,000 AFY** of surface water that would otherwise be lost due to operational spills. This conserved water would be able to reduce the need for groundwater pumping or additional surface water diversions during drought events which would reduce the energy needs from pumping. This additional water left at the source will be available to address other needs in the region.

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

The "conserved" water from this Project will be stored in TID's surface reservoirs and in the groundwater table and no additional mechanism is needed.

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

The operational efficiencies that will be provided by this Project are expected to conserve an estimated average of 2,000 AFY of surface water that would otherwise be lost. This conserved surface water will be stored in TID's reservoirs and can be used during drought

events.

Other project benefits: Please provide a detailed explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

(1) Combating the Climate Crisis: E.O. 14008: "Tackling the Climate Crisis at Home and Abroad", focuses on increasing resilience to climate change and supporting climate-resilient development. Please describe how the project will address climate change, including:

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

Both the TID Drought Management Plan (DMP) and AWMP discuss Climate Change. In fact, the AWMP devotes an entire section to climate change which is found in Section 6 of the AWMP. The proposed project provides benefits that are consistent with many TID "Strategies to Mitigate Climate Change Impacts" identified in the AWMP including:

1) Reduce water loss,
2) Improve operational efficiency,
3) Increase water supply,
4) Improve water quality,
5) Practice resource stewardship: agricultural lands, aquatic life and habitat, surface and groundwater supplies,
6) Support long term/ regional water management planning,
7) Aggressively increase water use efficiency, and
8) Expand water storage and conjunctive management
9) The Project uses a low maintenance device, which saves District labor and driving time that will result in lower greenhouse gas (GHG) generation and has monetary benefits in replacement parts.
10) The Project uses modern technology which allows for remote control. This remote operation will save District staff time, which can then be utilized for other water management tasks, thereby resulting in improved water efficiencies in the canal system.

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

Yes, the Project will improve the management and strengthen the sustainability of water supplies by increasing efficiency and operational flexibility. The Project is expected to:

  - Reduce TID's dependence on groundwater pumping, thereby reducing negative impacts to the environment and the community
  - Provide increased flexibility in the distribution system for more timely water delivery to agricultural producers

- Increase surface water supplies for water delivery during drought.

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

The Project will implement a renewable energy system by installing a solar energy system with battery backup for the Rubicon Flume Gates.

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

Yes, implementation of the project will allow for remote monitoring and operation of the drop structures, and reducing the vehicle travels currently taking place. The Project will reduce the miles driven by TID staff by approximately 3,200 miles per year that were required to manually adjust the drop structures in order to maintain operational levels. The reduction in miles driven will reduce carbon dioxide emissions by 1,457,468 grams every year during the life of the Project.

Additionally, the Project will save an estimated average of 2,000 AFY of surface water for irrigation purposes that would otherwise be lost from the canal system. This water will go to agricultural uses which grow carbon sequestering trees and crops. This conserved water would also be able to reduce the need for groundwater pumping or additional surface water diversions which would reduce the energy needs for pumping and delivery, thus reduce the greenhouse gas emissions from this activity.

(2) Disadvantaged or Underserved Communities: E.O. 14008 and E.O. 13885 support environmental and economic justice by investing in underserved and disadvantaged communities and addressing the climate-related impacts to these communities, including impacts to public health, safety, and economic opportunities. Please describe how the project supports these Executive Orders, including:

- *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.*

The proposed **Project directly serves, and benefits disadvantaged and historically underserved communities**. It will provide significant benefits resulting from an estimated average water savings of **2,000 AFY** including establishing that amount of "new" (not previously available) water supply, generating economic savings, creating economic growth opportunities, increased health benefits and reduced detrimental environmental impacts.

The Project proposes water system improvements that will help to mitigate impacts of drought which can cause the following associated potential public health and social concerns:

- Compromised quantity and quality of drinking water
- Diminished living conditions related to energy, air quality, and sanitation and hygiene
- Compromised food and nutrition
- Increased incidence of illness and disease
- Elevated levels of dust and related particles impacting respiratory complications

The water conservation/savings resulting from this Project will positively impact all customers of the TID, including those that are considered a disadvantaged community, which is approximately 92% of the population within TID's service area.

- *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% of the statewide annual median household income for the State, or the applicable state criteria for determining disadvantaged status.*

In 2020; the annual median household income (MHI) for the State of California was $78,672; per the U.S. Census Quickfact Tool. To be deemed a disadvantaged community (DAC), the community's MHI must be less than or equal to 80% of the state MHI; ($62,937 in 2020 dollars.) TID serves the communities of Turlock, Denair, Hughson, Modesto, Ceres, Keyes, Delhi, Ballico and Hilmar/Irwin. The MHI in 2020 dollars for the communities in the TID service area can be seen in the table below. The table shows that Turlock, Ceres, Keyes, Ballico, and Modesto (denoted in red font) are equal to or less than the $62,937 disadvantaged community threshold. All totaled then, **approximately 92% of TID's service area is comprised of DACs**

Table 3. TID Disadvantaged Communities Determination

CITY	*MHI*	*Population*	*DAC Population*
Turlock	$60,799	72,740	72,740
Denair	$71,277	5,101	0
Hughson	$83,231	7,481	0
Modesto	$62,182	218,464	218,464
Ceres	$59,247	49,302	49,302
Keyes	$46,250	5,672	5,672
Delhi	$63,475	10,656	0
Ballico	$62,500	538	538
Hilmar/Irwin	$72,054	5,164	0
	Total	**375,118**	**346,717**

**Note only south Modesto is served by TID, but for convenience, the entire Modesto population is included in MHI related calculations.*

- *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.

E.O. 13985 defines **"**underserved communities" as 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 including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality…"

TID primarily serves customers in Stanislaus County California. According to the 2020 US Census, approximately 49.5% of Stanislaus County are Hispanic/**Latino**, which is a greater percentage than either the state of California (40.2%), or the country (18.9%). By the definition of E.O. 13985, the Latino community has been **traditionally underserved**; the proposed Project will benefit this underserved community.

Approximately 8.8% of Stanislaus County are **disabled**, according to the 2020 US Census; greater than the state of California average (6.8%), and the country (8.7%). By the definition of E.O. 13985, the disabled community has been **traditionally underserved**; the Project will benefit this underserved community.

According to the 2020 US Census, the median household income for Stanislaus County is $62,783, which is below the average for the state of California of $78,672, and the nation at $64,994. Stanislaus County is **economically disadvantaged**, meeting the E.O. 13985 definition of an **underserved** community.

TID serves the communities of Turlock, Denair, Hughson, Modesto, Ceres, Keyes, Delhi, Ballico and Hilmar/Irwin, which suffer from poverty rates of 15%, 14.3%, 8.8%, 12.4%, 14.5%, 29.8%, 17.1%, 21.2%, and 14.6% respectively. Based on the U.S. Census Quickfact Tool, the state of California has 11.5% of its living in persistent poverty; therefore, all of the communities in TID's service area, excluding Hughson, have a greater percent of their population **living in poverty** than the State average. Therefore, according to the E.O. 13985 definition, the vast majority of TID service area is an **underserved** community.

The US Health Resources and Services Administration have designated Stanislaus County as a "**Medically Underserved** Area" (Medical Underservice Index 61.1) The percent of Stanislaus County residents identifying their health as fair or poor rose from 16.3% (between 2011- 2013) to 19.8% (between 2015-2017). During the same time period, the

percent of Stanislaus County residents identifying their health as "good" decreased 13%; the most of any category.

According to the Centers for Disease Control and Prevention (CDC), chronic diseases are considered conditions that last a year or more, limit daily living activities, and/or require ongoing medical attention. In Stanislaus County, chronic diseases account for the majority of deaths and are the leading drivers in health care costs (CDC, 2018) (CDC, 2019). Four of the top five causes of death in Stanislaus County all had higher percentages of total deaths than the state average, except for cancer, and made up 57.7% of all deaths in Stanislaus County from 2015-2017. The 2019 CDPH County Health Status Profiles ranked Stanislaus County 56th out of 58 counties for deaths due to coronary heart disease. The Project will benefit **this community that is underserved from a medical/health standpoint**.

Stanislaus County is also an educationally underserved community. In 2018, only 49% of Stanislaus County third grade students scored "proficient or higher" on the CAASPP English Language Arts/Literacy exam; in comparison with almost twice as many students (not economically disadvantaged) scoring "proficient or higher" on the same exam. Over half of Stanislaus County adults aged 25 and older have only a high school degree or less. Only 16 percent of Stanislaus County adults a four-year college degree or higher. Almost one-eighth of Stanislaus County adults have less than a 9th grade education. The Project will benefit **this educationally underserved community**.

Additionally, the TID service area suffers from **high unemployment** rates which are demonstrated through the California Office of Environmental Health Hazard Assessment's online mapping tool; CalEnviroScreen 4.0. As seen in the CalEnviroScreen map below, the majority of the census tracts within TID's service area suffer from unemployment rates significantly higher than the rest of California. The average **unemployment rate for TID's service area is approximately 70% higher than the rest of California census tracts**.

Figure 4. Unemployment Map for TID's Service Area

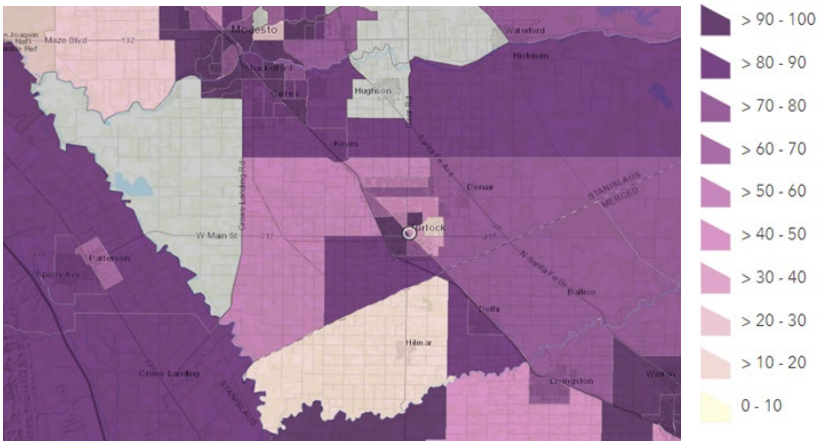


Table 4. Unemployment by Census Tract

Census Tract	% Higher than the rest of California	Census Tract	% Higher than the rest of California
6099003100	N/A	6099003606	57
6099002301	96	6099003605	78
6099002402	99	6099003805	62
6099002401	91	6099003909	46
6099002302	87	6099003908	58
6099002702	93	6099003906	92
6099002701	74	6099003804	92
6099002501	88	6099003802	96
6099002504	88	6099003803	78
6099002604	99	6099003905	20
6099002503	82	6099003904	39
6099002602	98	6099003604	73
6099003001	87	6090003700	89
6099002902	N/A	6047000201	79
6099002901	81	6047000203	88
6099003002	87	6047000202	88
6099003603	58	6047000402	14

As shown above, TID's service area already suffers from significant unemployment in comparison with the rest of the state. This service area is mostly rural, and agriculture is the primary industry. Without reliable water sources, agriculture production will be significantly impacted, more jobs will be lost, and unemployment will rise even further. The water conserved through the implementation of the Project will provide job security for agricultural workers and potentially stimulate the agricultural industry, creating more jobs in the future. **The Project will benefit community that is underserved from an employment perspective.**

(3) Tribal Benefits: The Department of the Interior is committed to strengthening tribal sovereignty and the fulfillment of Federal Tribal trust responsibilities. The President's memorandum "Tribal Consultation and Strengthening Nation-to-nation Relationships" asserts

the importance of honoring the Federal government's commitments to Tribal Nations. Please address the following, if applicable:

- *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?*

  While there are no tribal communities in the immediate vicinity of the Project site, reduced groundwater pumping will allow increased sustainability of water resources that could benefit other tribal communities using these resources. This project will result in reduced groundwater pumping and water conservation, which will benefit the entirety of the Central Valley, including Tribes in this region. TID is the Central Valley's major agricultural water provider and provides the water necessary to grow 40% of the United States fruits, nuts, and other table foods. The water conserved by this Project will allow TID to continue to provide the necessary water to maintain food production for the Central Valley, including Tribal 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?*

  California's water systems are widely interconnected. Many municipalities throughout the state rely on water resources from the Central Valley via the State Water Project (SWP) and other canals. Considering the interconnectedness of California's water systems, TID works in coordination with the City and County of San Francisco, San Joaquin Tributaries Authority (SJTA) and the East San Joaquin Water Quality Coalition (ESJWQCL) as well as various water committees and groups forming at the county and state levels. Each authority and association are involved in activities that relate to different aspects of TID's water management activities. TID has been leading the collective efforts by coordination with other regions to ensure availability of water resources for agricultural and other users. Therefore, any water savings within TID's irrigation service area, such as that anticipated by **the proposed Project, will result in benefits including water quality improvements and economic growth to a variety of users throughout the region and California including the tribal communities**.

  According to the CDC, severe drought conditions can negatively affect air quality. During drought, there is an increased risk for wildfires and dust storms. Particulate matter suspended in the air from these events can irritate the bronchial passages and lungs. This can make chronic respiratory illnesses worse and increase the risk for respiratory infections like bronchitis and pneumonia. Water savings from this project is a step towards conserving valuable water sources that is most needed during drought conditions experienced in the

region, which will then **generally improve air quality and related public health in the region, including that of tribal communities.**

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

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

  This is not applicable to this Project as TID does not maintain any interstate agreements.

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

  The Project will provide direct benefits to TID's agricultural producers that rely on consistent water resources to irrigate their crops. Considering California is the largest agricultural producing state in the country, ensuring that agricultural producers have adequate water supplies has economic and health benefits for the entire country. Therefore, any additional water savings within TID, such as that anticipated from the proposed Project, will provide agricultural producers in TID's service area more reliable water supplies and thus more reliable agricultural output.

  In addition, the Tuolumne River and Turlock Lake provide an ideal setting for water-oriented outdoor activities. The recreation area features the lake with its 26 miles of shoreline and the foothill country leased from the TID in 1950. The City of Turlock Economic Development Strategic Plan states that there is no natural local attraction to draw visitors, other than the Turlock Lake. These recreational opportunities have been providing ideal destinations for visitors that have been an economic vehicle for the disadvantaged community of TID. The proposed Project will help to mitigate the impacts of drought on water levels of the lake that provides recreational and tourism activities with a direct economic impact on the local community.

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

  First and foremost, the project complies with the larger initiative of California Water Code (CWC) §10608.48.c, which requires agricultural water suppliers to implement Efficient Water Management Practices (EWMPs) "if the measures are locally cost effective and technically feasible." The Project satisfies one of these required EWMPs: "**Automate Canal Control Structures**." (CWC 10608.48 c (9)).

  In addition, TID is a member of the West Turlock Subbasin Groundwater Sustainability Agency (WTSGSA). As a member of this agency, TID works with other agencies and stakeholders within the Turlock Subbasin to comply with the SGMA and develop the tools needed to achieve long term groundwater sustainability by identifying additional ways to maximize local water supplies, enhance conjunctive management practices and recharge

the water system. The proposed water system improvement Project will help to address sustainability which will benefit the initiatives of the TID, WTSGSA and the following:

1. Initiative by the TID Irrigation Facilities Master Plan, to, "maintain and improve the level of irrigation service provided to its growers through comprehensive, strategic and cost-effective rehabilitation and modernization of TID irrigation facilities".
2. Initiative and goal of the Turlock Groundwater Basin Association (TGBA) Groundwater Management Plan to, "support and encourage water conservation".
3. initiative and goal of the TID Drought Management Plan to implement "operational modifications to increase efficiency.

The Project is consistent with TID's 2020 Agricultural Water Management Plan (AWMP) Drought Management Plan, and draft Irrigation Facilities Master Plan which identifies and evaluates potential modernization projects for the water distribution infrastructure, such as the proposed MC automation Project. The Project will help to support water conservation, water efficiency and help to achieve drought resilience through an estimated surface water savings of approximately **2,000 AFY**.

In September of 2014, the State of California voted to implement the SGMA in response to groundwater depletion and the destruction of aquifers due to subsidence caused by over-pumping. The proposed Project's expected reduction of groundwater pumping and surface water savings will support SGMA compliance, improving water quality and operational flexibility, and improving customer service with more stable flows.

TID overlies the San Joaquin Valley Basin which is identified as a High-Priority Basin by the California Department of Water Resources' Sustainable Groundwater Management Basin Prioritization Model. This means that groundwater resources are being rapidly depleted in the San Joaquin Valley Basin and irrigation districts that overly the basin (e.g., TID) must reduce groundwater pumping and/or increase groundwater recharge to reduce subsidence that is currently threatening local aquifers. The proposed Project will work toward achieving that important goal.

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

As a result of extreme drought conditions present in California and particularly along the San Joaquin River's tributaries, the State Water Resources Control Board (SWRCB) issued a curtailment order to various water agencies and water districts restricting the amount of water diverted from the Tuolumne and other San Joaquin river tributaries. This curtailment order severely impacts many water users throughout the State (from Turlock to San Francisco). **Water savings from this Project is an incremental step to help keep the water at the source, to ease tension and conflicts over water in the area.**

Evaluation Criterion D-Complementing On-Farm Irrigation Improvements (10 points)

Up to 15 points may be awarded for projects that describe in detail how they will complement on-farm irrigation improvements eligible for NRCS financial or technical assistance.

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.*
    - *Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?*
    - *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.*
    - *Applicants should provide letters of intent from farmers/ranchers in the affected project areas. (include and reference letters of intent provided from farmers/ranchers by TID is available)*

Many growers in TID's service area use Natural Resource Conservation Service (NRCS) funding for improved water efficiency for their crops. NRCS tracks their funded installations by county, not by an irrigation district service area. Accordingly, from 2016 to 2020, NRCS funded 203 high-efficiency irrigation systems involving over 8,300 acres of farmland in Stanislaus County. Since TID serves approximately 50% of the irrigatable land in Stanislaus County, it is estimated that approximately 01 NRCS-fund projects were installed in TID's service area during this timeframe.

TID is supportive of these high-efficiency irrigation systems, however the challenge for TID is that its distribution system was originally designed to supply "macroheads" that involve short, consistent, high-flow (15-20 CFS) deliveries for flood irrigation. The use of high-efficiency irrigation systems has created a new type of customer who now demands "microhead" deliveries that involve long, varying flows at lower rates (2-4 CFS). These microhead demands present operational and scheduling difficulties for TID in that it must meet these demands using a system designed to supply macroheads for conventional flood irrigation. Also, meeting microhead demands results in more operational spill given the varying nature of these demands. **The proposed Project will directly complement on-farm improvements funded through NRCS assistance programs** by improving TID's ability to better accommodate microhead deliveries and maintain high levels of irrigation service to customers who convert to NRCS-funded high-efficiency systems. By implementing the Project, TID can more readily adjust flows to meet microhead demands

downstream of the Project and can capture operational fluctuations from microhead demands upstream of the Project. Additionally, the Project can support other growers in the Project's service area who wish to implement NRCS-funded high-efficiency systems for their crops. Together, this Project and the NRCS-funded on-farm improvements are expected to encourage continued use of surface water for irrigation in-lieu of groundwater pumping. This will conserve surface water supplies, with benefits to ongoing water use efficiency, drought resilience, and groundwater sustainability.

The improved service gained from implementing the proposed Project would help TID growers to adopt more efficient and productive on-farm irrigation systems, leading to increased water conservation over time as well as increased farm profitability. This is consistent with TID's IFMP which established the overarching goal of:

"Maintaining and improving the level of irrigation service provided to its growers through comprehensive, strategic and cost-effective rehabilitation and modernization of TID irrigation facilities"

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

      As discussed above, the proposed Project will directly facilitate the on-farm improvements by improving TID's ability to better accommodate microhead deliveries and maintain high levels of irrigation service to customers who convert to (NRCS-funded) high-efficiency systems.

    - *Will the proposed project complement the on-farm project by maximizing efficiency in the area? If so, how?*

      Yes, the proposed project certainly compliments and maximizes the on-farm projects which are literally called "high efficiency" systems. These NRCS-funded high-efficiency systems demand microhead deliveries which can better be provided the proposed project. By implementing the Project, TID can more readily adjust flows to meet microhead demands downstream of the Project and can capture operational fluctuations from microhead demands upstream of the Project. Additionally, the Project can support other growers in the Project's service area who wish to implement NRCS-funded high-efficiency systems for their crops. Together, this Project and the NRCS-funded on-farm improvements are expected to encourage

continued use of surface water for irrigation in-lieu of groundwater and to conserve surface water supplies, with benefits to ongoing water use efficiency, drought resilience, and groundwater sustainability.

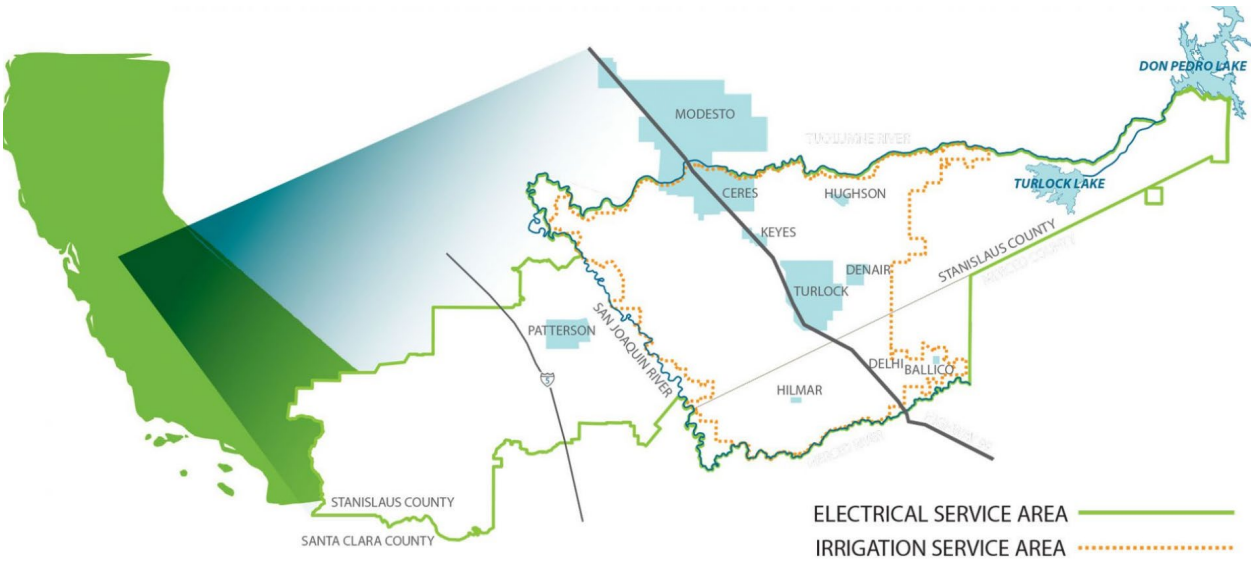
- *Describe the on-farm water conservation or water use efficiency benefits that expected to result from any on-farm work.*
    - *Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

    It is difficult to estimate the potential on-farm water savings that could result from the Proposed project, however according to the USDA Natural Resources Conservation Service website, "converting irrigation systems from medium or high pressure to low pressure could cut energy costs by up to $100 million annually." according to an August 15th, 2014 publication from the Center for Urban Education about Sustainable Agriculture (CUESA) https://cuesa.org/article/10-ways-farmers-are-saving-water , "properly installed drip irrigation can save up to 80% more water than conventional irrigation, and can even contribute to increased crop yields."

- *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 improved for NRCS funding and technical assistance to complement funded WaterSMART projects.*

Figure 3 below shows the water service area boundaries for the Turlock Irrigation District.

Figure 5. TID Service Area



Evaluation Criterion E-Planning and Implementation (8 points)

Up to 8 points may be awarded for these subcriteria.

Subcriterion E.1 Project Planning

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

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 link to the planning document may also be considered where appropriate.

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.*

  There are a variety of district and system-wide planning documents that provide support for and prioritize the proposed Project including the following:

  1. Drought Management Plan
  2. Groundwater Sustainability Plan for the Turlock Subbasin
  3. Groundwater Sustainability Plan for the San Joaquin Valley Basin
  4. Irrigation Delivery Operations Assessment
  5. Draft Irrigation Facilities Master Plan
  6. Agricultural Water Management Plan

- *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).*

  Water management planning has been the guiding foundation for TID's operational and capital project activities. TID's first AWMP was adopted in July 1999 and approved by the Agricultural Water Management Council in May 2001. TID was one of the first agencies in California to comply with California Senate Bill SBx7-7 and submit their plan to the California Department of Water Resources. That planning effort resulted in TID's AWMP, which listed automation of canal control structures (e.g., the proposed Project) as a top priority. In fact, this proposed **Project is in direct alignment with several of the strategies identified in the AWMP: to mitigate climate change impacts; improve operational efficiency and transfers; aggressively increase water use efficiency; practice resource stewardship; preserve, upgrade, and increase monitoring, data analysis, and management**.

TID overlies the San Joaquin Valley Basin which is identified as a High-Priority Basin by the California Department of Water Resources' Sustainable Groundwater Management Basin Prioritization Model. This means that groundwater resources are being rapidly depleted in the San Joaquin Valley Basin and irrigation districts that overly the basin must reduce groundwater pumping to reduce subsidence that is currently threatening local aquifers. **This proposed Project is consistent with the priories of the GSP, as it** directly benefits the local groundwater basin by conserving local groundwater resources.

- *If applicable, provide a detailed description of how a project is addressing an adaptation strategy specifically identified in a completed WaterSMART Basin Study or Water Management Options Pilot (e.g., a strategy to mitigate the impacts of water shortages resulting from climate change, drought, increased demands, or other causes)*

  For many decades now, TID has faced variability in surface water supplies due to drought and climate change. To **better plan for the impacts of this variability** and resulting water shortages, TID developed strategies and policies to manage water shortage allocation. Policies were developed in response to the 1976-1977 drought and to the 1987-1992 and 2012-2015 drought. In fact, given the severity of the 2012-2015 drought and the continued impacts, drought is considered to be archetypal for TID planning purposes.

  A **key aspect of TID's drought management policy** is to plan for strategic, conjunctive management of surface water and groundwater supplies for a period of forecasted consecutive dry years. The DMP Drought Resilience Opportunities and Constraints Section (page G-7 of the AWMP) refers to the AWMP Section 7 - Efficient Water Management Practices that describes the actions that TID is planning to take to accomplish more efficient water management, including **more efficient water operations that will result from implementation of the proposed Project.**

  Additionally, as one of the strategies noted in the AWMP, **TID practices resource stewardship to mitigate climate change impacts**. As noted above, the proposed Project is consistent with TID's AWMP and DMP, promising **more efficient water operations that will result in reduced groundwater pumping, consistent with the 2014 State of California SGMA** which was enacted in response to groundwater depletion and the destruction of aquifers due to subsidence caused by over-pumping. SGMA requires that all local Groundwater Sustainability Agencies (GSAs) in non-critically over drafted basins adopt GSPs to will serve as the guiding planning documents for all groundwater sustainability project planning.

Subcriterion E.2 Readiness to Proceed

Points may be awarded based upon the extent to which the proposed project is capable of proceeding upon entering into a financial assistance agreement. Please note, if your project is

selected, response provided in this section will be used to develop the scope of work that will be included in the financial agreement.

Applications that included a detailed project implementation plan (e.g., estimated project schedule that shows the stages and duration of the proposed work, including major tasks, milestones, and dates) will receive the most points under this criterion.

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

  This project is shovel ready. Plans and specifications are complete and upon notice of award of this grant request, TID will:

  1. Start the processes to receive the any necessary permits
  2. Coordinate and supply the necessary information with Reclamation to receive NEPA clearance
  3. Start procurement of material and begin construction of the Project

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

  It is anticipated that the following permits will be required:

  - Electrical Permit from TID. Simple process (self-issuance) provides use of licensed electricians and field inspections for construction.
  - Permit from the San Joaquin Valley Air Pollution Control District. TID staff are skilled in submitting these applications.

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

  Engineering Design Plans for the proposed Project were completed in December 2021 and are attached in Appendix C. This Project is shovel ready and will be able to start construction upon execution of funding agreement with the Bureau of Reclamation.

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

  A CEQA Notice of Exemption has been filed with the State Clearinghouse (#2022070286).

- *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%), construction/installation (100% complete). Was the expected timeline for environmental and cultural compliance discussed with the local Reclamation Regional or Area Office?*

Engineered plans were competed in Dec 2021; construction is expected to begin November 2023. This type of in canal work construction can only be constructed during the offseason- November to February. It is expected that the work will be accomplished over three off seasons for a total duration of 27 months (each with three months of construction followed by nine months of inactivity). TID will start the NEPA documentation process upon notice of award to ensure NEPA clearance before November 2023. The anticipated schedule is as follows:

Table 5. Project Schedule

Estimated Project Schedule		
Task/Milestone	Start Date	Completion Date
Plans/ Specs Complete (shovel ready)		Completed
Funding Award Announcement		May 2023
Procure Permits	June 2023	July 2023
Process NEPA Environmental	June 2023	October 2023
Phase 1 Construction (Drop 7)	November 2023	February 2024
Phase 2 Construction (Drops 4 & 5)	November 2024	February 2025
Phase 3 Construction (Drops 6 & 8)	November 2025	February 2026

Evaluation Criterion F-Collaboration (6 points)

Up to 6 points may be awarded for projects that promote and encourage collaboration among parties in a way that helps increase the sustainability of the water supply.

- *Please describe how the project promotes and encourages collaboration. Consider the following:*
    - *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?*

There is widespread support for the proposed Project. TID maintains close relationships with irrigation districts on other tributaries of the San Joaquin River and, through those relationships, is able to share information regarding successes and challenges to help shape effective regional water management programs. TID works and coordinates with the City and County of San Francisco, San Joaquin Tributaries Authority (SJTA), the East San Joaquin Water Quality Coalition (ESJWQC), as well as various water committees and groups forming at the county and state levels. Each authority and association are involved in activities that relate to different aspects of TID's water management activities. Additionally, the DMP was developed through a collaborative process with multiple agencies (detailed on page G-16 of the DMP). As demonstrated by the support letters (Appendix A), the need

for this Project is well recognized in the region. TID does not have any partners for completing the construction of this Project.

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

  Extensive coordination and collaboration are a vital component of TID operations. TID often reports data to the California Energy Commission, the California Department of Water Resources, and others. TID and the Modesto Irrigation District (MID) hold joint water rights and ownership of the Don Pedro Reservoir, which results in their close and continuous efforts to coordinate and manage this shared resource. TID also partners with cooperating entities on watershed studies and other efforts surrounding Tuolumne River water supply and demand; including instream flows, snowpack, agricultural and urban demand, climate change, and other considerations. TID also works with regulatory agencies that affect the flexibility with which TID can store and deliver water.

  One example of such coordination is TID's role in the formation and ongoing operation of the WTSGSA, an association of local municipal water systems and agencies located in the western portion of the Turlock Subbasin. As a member of the WTSGSA, TID is actively involved in subbasin-wide SGMA-implementation efforts. WTSGSA and the East Turlock Subbasin GSA collaborated on and expect to adopt and implement the Turlock Subbasin GSP. TID also meets with local cities and counties regarding groundwater resources, water conservation and recycling projects, and public education and outreach.

  The Project has been identified as a priority for TID to achieve water efficiency and flexibility in supply management. TID's record keeping effort on water spills and completion of the state of an art modeling will serve as a model for other agencies to follow, as this information and information regarding water saving will be shared with them after construction.

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

  Since 1998, the TID has utilized a sophisticated SCADA system to monitor and record measurements of system flow and water quality to better understand the quantity and quality of water within the canal system. The data is also useful in determining how canal water quality changes as a result of different operational scenarios. The SCADA system has been continuously updated/improved with current technology; today TID collects water measurement data from 397 SCADA collection points including flows at the heads of most laterals, main diversion points, and intermediate points in the distribution system, 137 customer turnouts and at 14 operational spill sites.

Through SCADA integration, the proposed Project will make new information available to and shared by TID water managers, including real time water levels and flow rates. This will give TID water managers quicker and more accurate control, allowing them to respond quickly, and enabling more consistent and reliable water deliveries as well as reducing spillage.

As a leader in the region, TID will share the Project's performance measures and benefits with other agencies to encourage their water conservation and guide them in implementing their own water efficiency projects. As the region is experiencing an exceptional drought situation and is dealing with legal concerns over water rights and curtailment, successful water efficiency Projects are a proven means of encouragement for other agencies to follow.

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

As shown Appendix A, this Project is strongly supported by regional government officials.

Evaluation Criterion G-Additional Non-Federal Funding (4 points)

Table 6. Non-Federal Funding Summary

Percentage of Non-Federal Funding		
Non-Federal Funding Amount	**Total Project Cost**	**Non-Federal Funding Percentage**
$2,516,673	$4,516,673	56%

Evaluation Criterion H-Nexus to Reclamation (4 points)

Up to 4 points may be awarded if the proposed project is connected to a Reclamation project or Reclamation activity. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.

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

- *Does the applicant have a water service, repayment, or operations and maintenance (O&M) contract with Reclamation?*

No, TID does not have a water service, repayment, or O&M contract with Reclamation.

- *If the applicant is not a Reclamation contractor, does the applicant receive Reclamation water through a Reclamation contractor or by any other contractual means?*

  While TID is not a Reclamation contractor, TID receives water from the San Joaquin Valley Groundwater Basin that utilizes SWP water to recharge.

- *Will the proposed work benefit a Reclamation project area or activity?*

  Although there are no Reclamation projects in TID's service area, the Project will promote BOR activities; conservation and managing for excellence. TID relies heavily on groundwater pumped from the San Joaquin Valley Basin that is recharged with SWP water imported from the Sacramento-San Joaquin Delta, which is home to several Reclamation Projects. The most notable Reclamation Project that takes place in the Delta is the Central Valley Project (CVP). SWP relies on successful management of the CVP in order to receive the water supply that several water purveyors throughout the State rely on. The Project will reduce the surface water loss TID is currently experiencing which will allow TID to limit its pumping from the San Joaquin Valley Basin, therefore reducing the basin's reliance on imported water for recharge. By reducing TID's reliance on pumped groundwater, more water can be stored in the Delta which will increase operational flexibility for the CVP and other Reclamation projects that are impacted by the progressively stringent management of the Delta's water resources.

- *Is the applicant a Tribe?*

  No, the applicant is not a Tribe.

Performance Measures

The Project proposes to automate the TID MC which will conserve water by preventing or reducing spillage due to flow overages and fluctuations. The Project success should not be affected by phased systemwide automation over a longer term, as it will offer both incremental and long-term benefits. Automation technologies will be maintained with in-house expertise and proven SCADA technology. Project benefits will include improved operational flexibility and scheduling, reduced operational water losses, reduced operational workload on District staff, and a reduced need for groundwater pumping.

Project performance will be measured by amount of spillage that will be prevented/reduced by the project. Pre-project estimates and/or historical data will form baseline data and will be compared with post-project measurements, as follows:

1. Establish Baseline Data

   Baseline data will be established either by measuring existing spillage or using documented historical spillage data. A measuring device will be positioned to measure spillage losses, for a minimum of one-year history of continuous measurements (pre-

project) will be provided for future comparison to post-project water usage. (Pre-project water diversions will be tracked using District diversion records, supplier diversion n records, and/or District-recorded delivery records. Spillage estimates may be based on these data in some cases.)

2. Collect Post-Project Data

   Post-project spillage losses will be measured and compared to pre project data. Sufficient data will be collected to account for seasonal and temporal variations.
3. Track post-project changes in the amount of water diverted and compare with pre-Certainly- project diversion data.
4. Compare estimated historical pre-project spills and compare with post projects spills
5. Report specific annual volume changes to spills as a result of the automation project.

After the Project is implemented, the main performance measure by which to quantify the benefits of the implemented Project is the water savings benefit measured by spill reduction using the Agricultural Water Management Council (AWMC) guidelines prepared for the CALFED Bay Delta Water Use Efficiency program (AWMC, 2007). As described under the Evaluation Criterion A (above), this methodology quantifies spillage reduction by comparing the average "without-project" spillage to the average "with-project" spillage from the canal(s) benefitted by the Project. Average "without-project" spillage represents the estimated future spillage that would occur if the Project were not constructed, while average "with-project" spillage represents the estimated future spillage that would occur (all else the same) after the Project is constructed. Once the Project is constructed and operational, the actual water savings will be quantified at spill sites benefitted by the Project as the difference between the average without-project spills by year type, whether normal or dry, and the with-project spills measured that year (expected to vary by year type). This performance measure will utilize spillage data from TID's existing measurement devices and sophisticated SCADA system. Hourly or daily spillage data are available at all spillage sites in recent years and will be available to monitor and quantify future project benefits.

Another Performance Measure can be the quantity of reduced groundwater pumping resulting from the implementation of the project, and the corresponding cost savings.

SECTION 2: PROJECT BUDGET

Funding Plan and Letters of Commitment

This Project is a key project for TID as its implementation will result in significant water savings for the region. There has been substantial expenditure to date to complete the Project plans and TID is eager and committed to start and complete the construction of this project upon award of this grant funding.

As shown in the draft TID Board Resolution, TID is committed to providing the remaining matching fund of $2,516,673 towards construction and staff time necessary to complete this project immediately.

TID will be providing the match funding with its own fiscal resources and no third-party funding will be required.

Budget Proposal

Table 7. Total Project Cost Summary

SOURCE	AMOUNT
Costs to be reimbursed with the requested Federal Funding	$2,000,000
Costs to be paid by the applicant	$2,516,673
Value of third-party contributions	$0
TOTAL PROJECT COST	**$4,516,673**

Table 8. Non-Federal and Federal Funding Sources Summary

FUNDING SOURCES	AMOUNT
Non-Federal Entities	
1.TID	$2,516,673
Non-Federal Subtotal	$2,516,673
REQUESTED RECLAMATION FUNDING	**$2,000,000**

Table 9. Budget Proposal

Budget Item	Computation		Quantity Type	Total Costs
	$/Unit	Quantity		
Salaries and Wages				
Project Manager (Matt Hazen)	$ 81.62	128	Hour	$ 10,447
Fringe Benefits				
Project Manager (Matt Hazen)	$ 79.89	128	Hour	$ 10,226
Travel				
N/A				
Equipment				
N/A				
Supplies/Materials				
N/A				
Contractual				
Drop Structure 4				
Mobilization/Demobilization, Bonds and Insurance	$ 45,000	1	LS	$ 45,000
Work Protection	$ 4,000	1	LS	$ 4,000
Miscellaneous Facilities and Operations	$ 32,000	1	LS	$ 32,000
Existing Gate Removal	$ 5,000	1	LS	$ 5,000
Concrete Demolition	$ 45,000	1	LS	$ 45,000
Concrete Additions	$ 3,800	43	CY	$ 163,400
F&I Rubicon Flume Gates	$ 335,000	1	LS	$ 335,000
F&I Fresno Valves & Casting Slide Gates & Rotork Actuators	$ 260,000	1	LS	$ 260,000
F&I Steel Catwalks	$ 36,000	1	LS	$ 36,000
F&I Steel Stop Logs and Guides	$ 10,300	3	EA	$ 30,900
F&I Chain Link Fence	$ 90	60	LF	$ 5,400
Drop Structure 5				
Mobilization/Demobilization, Bonds and Insurance	$ 36,000	1	LS	$ 36,000
Worker Protection	$ 3,000	1	LS	$ 3,000
Miscellaneous Facilities and Operations	$ 25,000	1	LS	$ 25,000
Existing Gate Removal	$ 13,000	1	LS	$ 13,000
Concrete Demoltion	$ 14,000	1	LS	$ 14,000
Concrete Additions	$ 3,700	29	CY	$ 107,300
F&I Rubicon Flume Gates	$ 242,000	1	LS	$ 242,000
F&I Fresno Valves & Casting Slide Gates & Rotork Actuators	$ 265,000	1	LS	$ 265,000
F&I Steel Catwalks	$ 44,000	1	LS	$ 44,000
F&I Steel Stop Logs and Guides	$ 18,000	2	EA	$ 36,000
F&I Chain Link Fence	$ 90	60	LF	$ 5,400
Drop Structure 6				
Mobilization/Demobilization, Bonds and Insurance	$ 44,000	1	LS	$ 44,000
Worker Protection	$ 4,000	1	LS	$ 4,000
Miscellaneous Facilities and Operations	$ 38,000	1	LS	$ 38,000
Existing Gate Removal	$ 13,000	1	LS	$ 13,000
Concrete Demoltion	$ 14,000	1	LS	$ 14,000
Concrete Additions	$ 4,200	41	CY	$ 172,200
F&I Rubicon Flume Gates	$ 282,000	1	LS	$ 282,000
F&I Fresno Valves & Casting Slide Gates & Rotork Actuators	$ 297,000	1	LS	$ 297,000
F&I Steel Catwalks	$ 35,000	1	LS	$ 35,000
F&I Steel Stop Logs and Guides	$ 17,800	2	EA	$ 35,600
F&I Chain Link Fence	$ 90	60	LF	$ 5,400

Drop Structure 7				
Mobilization/Demobilization, Bonds and Insurance	$ 38,000	1	LS	$ 38,000
Worker Protection	$ 3,000	1	LS	$ 3,000
Miscellaneous Facilities and Operations	$ 19,000	1	LS	$ 19,000
Existing Gate Removal	$ 8,000	1	LS	$ 8,000
Concrete Demoltion	$ 26,000	1	LS	$ 26,000
Concrete Additions	$ 3,600	26	CY	$ 93,600
Concrete Floor Extensions	$ 1,300	32	CY	$ 41,600
F&I Rubicon Flume Gates	$ 245,000	1	LS	$ 245,000
F&I Fresno Valves & Casting Slide Gates & Rotork Actuators	$ 276,000	1	LS	$ 276,000
F&I Steel Catwalks	$ 32,000	1	LS	$ 32,000
F&I Chain Link Fence	$ 90	60	LF	$ 5,400
Drop Structure 8				
Mobilization/Demobilization, Bonds and Insurance	$ 42,000	1	LS	$ 42,000
Worker Protection	$ 4,000	1	LS	$ 4,000
Miscellaneous Facilities and Operations	$ 31,000	1	LS	$ 31,000
Existing Gate Removal	$ 26,000	1	LS	$ 26,000
Concrete Demoltion	$ 22,000	1	LS	$ 22,000
Concrete Additions	$ 3,300	42	CY	$ 138,000
F&I Rubicon Flume Gates	$ 363,000	1	LS	$ 363,000
F&I Fresno Valves & Casting Slide Gates & Rotork Actuators	$ 203,000	1	LS	$ 203,000
F&I Steel Catwalks	$ 36,000	1	LS	$ 36,000
F&I Chain Link Fence	$ 90	60	LF	$ 5,400
Hickman Spill Structure				
Mobilization/Demobilization, Bonds and Insurance	$ 6,000	1	LS	$ 6,000
Worker Protection	$ 1,000	1	LS	$ 1,000
Miscellaneous Facilities and Operations	$ 3,000	1	LS	$ 3,000
Existing Gate Removal	$ 8,000	1	LS	$ 8,000
Concrete Demoltion	$ 6,000	1	LS	$ 6,000
Concrete Additions	$ 2,800	5	CY	$ 14,000
F&I Rubicon Flume Gates	$ 101,000	1	LS	$ 101,000
F&I Handrail	$ 100	14	LF	$ 1,400
Third-Party In-Kind Contributions				
N/A				
Other				
N/A				
TOTAL DIRECT COSTS				**$ 4,511,673**
Indirect Costs				
Reclamation Environmental Review				$ 5,000
TOTAL ESTIMATED PROJECT COSTS				**$ 4,516,673**

Budget Narrative

Salaries and Wages

The Project Manager, Matt Hazen, PE, has an hourly rate of $81.62. It is anticipated that he will spend approximately 128 hours on various tasks for the duration of the project.

Fringe Benefits

The only fringe benefits associated with the Project are the fringe benefits received by the Project Manager, Matthew Hazen, PE. His fringe benefits are $79.89/hour, and it is assumed that he will spend a total of 128 hours on various tasks for the duration of the Project.

Travel

Not applicable.

Equipment

All equipment purchases are included under the contractual section.

Materials and Supplies

All consultant material and supply expenses are covered within their contract which is listed in the contractual section below.

Contractual

As noted previously, TID will hire a contractor for construction of the proposed Project. The total costs associated with the construction of the water control structures will be $3,900,000. Procurement of all equipment, materials, supplies, goods, and services will be done in accordance with District procedures.

Third-Party In-Kind Contributions

Not applicable.

Environmental and Regulatory Compliance Costs

TID has allocated $5,000 for Reclamation's environmental review.

Other Expenses

Not applicable.

Indirect Costs

Environmental and Regulatory Compliance costs are the only indirect costs associated with Project implementation and can be seen in the table above.

SECTION 3: ENVIRONMENTAL AND CULTURAL RESOURCES AND COMPLIANCE

To allow Reclamation to assess the probable environmental and cultural resources impacts and costs associated with each application, all applicants must respond to the following list of questions focusing on NEPA, ESA, and NHPA requirements. Please answer the following questions

to the best of your knowledge. If any question is not applicable to the project, please explain why. The application should include the answers to:

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

  The Project involves automating 5 drop structures along TID's MC by replacing existing gates with a combination of Rubicon Flume Gates and actuated aluminum slide gates. The installation of these new gates is not anticipated to produce any significant or permanent impact on dust, air quality, or the surrounding animal habitat.

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

  The Project is categorically exempt from CEQA, and the Project site is not suitable as habitat for endangered species nor is a critical habitat. No impact will occur.

- *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 in the Project boundaries. The Project will involve work done on five drop structures along the MC owned by TID. Waters of the United States are any water deemed as "navigable", which some canals across the country fall into this category. However, this man-made canal is not used to transport interstate commerce and is therefore not considered to be a navigable water for the United States according to Section 329.8 of 33 CFR Part 329 Definition of Navigable Waters of the U.S.

- *When was the water delivery system constructed?*

  The man-made, cement lined canals of TID's irrigation system were constructed between 1900 and 1914.

- *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, the Project involves the modification of five water control structures throughout TID's MC. The five drop structures currently have to be manually adjusted to maintain operational water levels. The Project will replace the existing gates with Rubicon Flume Gates and actuated aluminum slide gates, which have been found to promote water conservation and provide superior water management compared to the existing system.

- *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 Project is categorically exempt from CEQA and there is no impact on historical or cultural resources. Additionally, the National Register of Historic Places tool provided by the National Park Service does not show any Historic Places at or within a ½ mile radius of the Project sites.

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

  There are no prehistoric or historic-archaeological resources that have been previously recorded within or near the Project site.

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

  According to the United States Environmental Protection Agency, California Tribal Lands and Reservations Map, there are no Tribal lands within or near the Project sites. Therefore, no access to Tribal lands will be negatively impacted by the Project.

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

  The Project will consist of the removal of the existing gates and installation of Rubicon Flume and actuated aluminum slide gates. No vegetation will be removed or introduced at the Project sites and therefore no noxious weeds or non-native invasive species will be spread.

SECTION 4: REQUIRED PERMITS OR APPROVALS

It is anticipated that the following permits will be required:

- Electrical Permit from TID. Simple process (self-issuance) provides use of licensed electricians and field inspections for construction.
- Permit from the San Joaquin Valley Air Pollution Control District. TID staff are skilled in submitting these applications.

SECTION 5: OVERLAP OR DUPLICATION OF EFFORTS STATEMENT

TID certifies that there is no overlap between the proposed project or any other active or anticipated proposals or projects in terms of activities, costs, or commitment of key personnel. TID also certifies that this proposal does not duplicate any proposal or project that has been submitted for funding consideration to any other potential funding sources.

SECTION 6: CONFLICT OF INTEREST DISCLOSURE

No actual or potential conflicts of interest associated with the implementation of this Project have been identified prior or during the time of submission of this application.

SECTION 7: UNIFORM AUDIT REPORTING STATEMENT

TID acknowledges the requirement for a Single Audit report and has/will continue to comply with this requirement.

SECTION 8: LETTERS OF SUPPORT AND LETTERS OF PARTNERSHIP

Please refer to Appendix A for the Project Letters of Support.

SECTION 9: OFFICIAL RESOLUTION

TID Board Members are scheduled to approve the Project Resolution at their next board meeting on August 16, 2022. The signed official resolution will be submitted to Reclamation within 30 days of the application due date. Please see the draft resolution below.

RESOLUTION NO. 2022 -

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE TURLOCK IRRIGATION DISTRICT AUTHORIZING AN APPLICATION FOR GRANT FUNDING BY THE BUREAU OF RECLAMATION'S WATERSMART WATER AND ENERGY EFFICIENCY GRANT PROGRAM FOR THE MAIN CANAL WATER EFFICIENCY IMPROVEMENT PROJECT

WHEREAS, the Turlock Irrigation District (the "District") proposes to implement the Main Canal Water Efficiency Improvement Project (the "Project"); and

WHEREAS, the District has the legal authority and is authorized to enter into a funding agreement with the United States Department of the Interior Bureau of Reclamation; and

WHEREAS, the District completed Plans and Specifications for the Project; and

WHEREAS, the District has prepared a CEQA Notice of Exemption for the Project; and

WHEREAS, the project would partially automate five of the Main Canal's water control structures to conserve water and to improve operational flexibility; and

WHEREAS, the United States Department of the Interior offers financial assistance in the form of grant funding through its Bureau of Reclamation's WaterSMART (Sustain and Manage America's Resources for Tomorrow) Water and Energy Efficiency Grant (WEEG) Program for this type of project. The WaterSMART WEEG provides three levels of funding up to a maximum of $5,000,000 and $2,000,000 in grant funding for longer term projects and $500,000 for shorter term projects, but not to exceed 50% of the total project cost; and

WHEREAS, the District desires to fund part of the cost of the Project with grant funding from the WaterSMART WEEG Program; and

NOW, THEREFORE, the Board of Directors of the Turlock Irrigation District hereby finds, determines, declares and resolves as follows:

1. The Board hereby supports a grant application to the WaterSMART WEEG Program for the Project; and

2. The Board hereby authorizes and directs the District's General Manager, or his or her designee, to complete, review, sign and submit, for and on behalf of the District, a grant application for the Bureau of Reclamation's WaterSMART WEEG Program for the Project in the amount of $2,516,673, and to take such other actions as necessary or appropriate to obtain this grant funding; and

3. The District's General Manager, or his or her designee, is hereby authorized and directed to execute a grant agreement with the United States Department of the Interior Bureau of Reclamation and amendments thereto, and is designated to represent the District in carrying out the District's responsibilities under such grant agreement, including certifying

disbursement requests on behalf of the District and compliance with applicable state and federal laws; and

4. If a grant award is made by the Bureau of Reclamation, the District commits to providing a minimum of 100% in matching funds ($2,516,673) for the Project, and up to the balance of funds needed to complete the construction of the Project; and

5. This Resolution shall take effect immediately.

Moved by Director , seconded by Director , that the foregoing resolution be adopted.

Upon roll call the following vote was had:

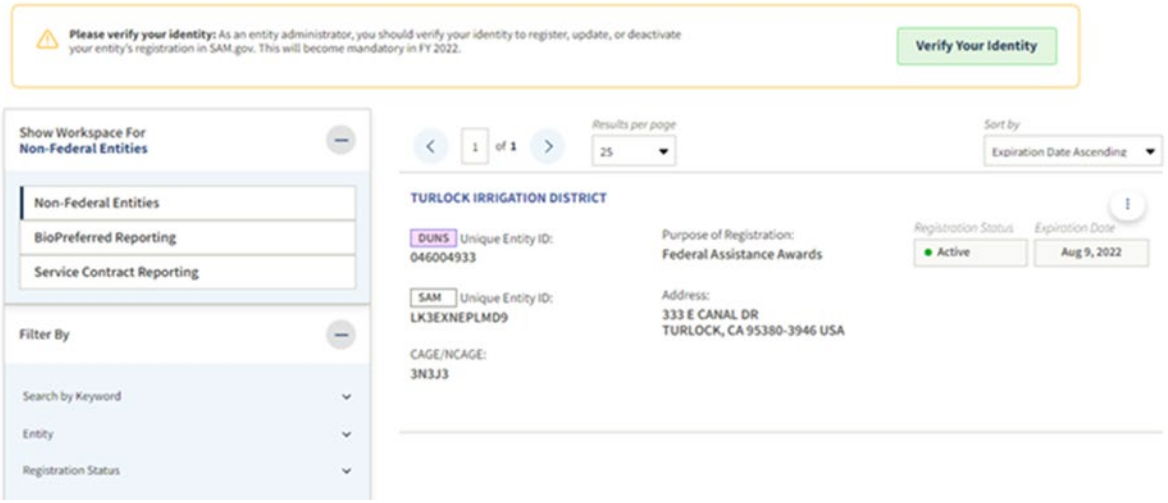
Ayes: Directors
Noes: Directors
Absent: Directors

The President declared the resolution _____.

I, Tami Wallenburg, Executive Secretary to the Board of Directors of the TURLOCK IRRIGATION DISTRICT, do hereby CERTIFY that the foregoing is a full, true and correct copy of a resolution duly adopted at a regular meeting of said Board of Directors held the day of August, 2022.

_____
Executive Secretary to the Board of
Directors of the Turlock Irrigation District

SECTION 10: PROOF OF SAM REGISTRATION



APPENICES

Appendix A: Project Letters of Support

Appendix B: Appendix 2.H of Turlock Irrigation District Irrigation Facilities Master Plan

Appendix C: Project Plans and Specifications

Appendix D: Water Savings Methodology

APPENDIX A: PROJECT LETTERS OF SUPPORT

JOSH HARDER
10TH DISTRICT, CALIFORNIA

COMMITTEE ON APPROPRIATIONS
LABOR, HEALTH AND HUMAN SERVICES, EDUCATION, AND RELATED AGENCIES
INTERIOR, ENVIRONMENT, AND RELATED AGENCIES

COMMITTEE ON AGRICULTURE
BIOTECHNOLOGY, HORTICULTURE, AND RESEARCH
LIVESTOCK AND FOREIGN AGRICULTURE

Congress of the United States
House of Representatives
Washington, DC 20515

209 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-4540-PHONE
(202) 225-3402-FAX

4701 SISK ROAD, SUITE 202
MODESTO, CA 95356
(209) 579-5458-PHONE
(209) 702-6569-FAX

harder.house.gov

July 27, 2022

Camille Calimlim Touton
Commissioner
Bureau of Reclamation
Financial Assistance Operations
Attn: NOFO Team
P.O. Box 25007, MS 84-27133
Denver, CA

RE: Turlock Irrigation District Main Canal Water Efficiency Improvement Project

Commissioner Touton,

I write to express my support of the Turlock Irrigation District's(TID) application for the Bureau of Reclamation WaterSMART Water and Energy Efficiency Grant Program to implement the Main Canal Water Efficiency Improvement Project (Project).

The proposed Project will automate five water control structures on TID's Main Canal to allow operators to remotely control water levels instead of through manual adjustments, thus allowing multiple changes daily. In doing so, the Project will allow TID to manage irrigation water more efficiently and give operators greater flexibility in water scheduling. The Project will also reduce staff workload; allow faster system response to desired changes; and improve water conservation. Moreover, the Project will result in more reliable and consistent water deliveries and will promote greater utilization of any basins or regulating reservoirs constructed downstream in the conveyance system.

The anticipated water savings resulting from the Project is an average of approximately 2,000 acre-feet per year of surface water that has historically spilled from TID's major canals due to flow overages and fluctuations that would now be controlled and reduced through this Project.

TID's Main Canal Water Efficiency Improvement Project is needed to improve water efficiency and water conservation in their canal system. Thank you for your full and fair consideration of the grant application submitted by the Turlock Irrigation District for the Bureau of Reclamation WaterSMART Water and Energy Efficiency grant program. If you have any questions, please do not hesitate to contact me.

Sincerely,

Josh Harder

Josh Harder
Member of Congress

APPENDIX B: APPENDIX 2.H OF TID'S IRRIGATION FACILITIES MASTER PLAN

Please refer to Appendix 2.H of TID's Irrigation Facilities Master Plan as referenced throughout the application.

APPENDIX C: PROJECT PLANS AND SPECIFICATIONS

Please refer to the Project plans and specifications.

APPENDIX D: WATER SAVINGS METHODOLOGY

Please refer to the following methodology that was used to calculate the Project's water savings.