North Unit Irrigation District

Improve Water Management & Conservation Through Spill Reduction at 58-11 Pipeline

WaterSMART – Small-Scale Water Efficiency Projects
Opportunity No. R24AS00059

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Executive Summary

Date:	January 12th, 2023
Applicant Name:	North Unit Irrigation District Category A Applicant
City/County/State:	Madras, Jefferson County, Oregon

To optimize conservation, control and management of irrigation water that is conveyed through the 58-11 pipeline (the pipeline), North Unit Irrigation District (the District, NUID) proposes to install a generic ramp flume at the terminus of the pipeline, equipped with reliable and rugged telemetry including a water-level pressure sensor, and programmable logic controller (PLC) to achieve effective Real-time Monitoring and Control (RTMC) of the pipeline. After installing a 4' ramp flume, the District will gain fuller control of its tail water releases and eliminate preventable losses resulting from a system which lacks a means of consistently monitoring the amount of water spilling at the pipeline terminus. The project will take approx. 20-30 days (160-240 labor hours) to complete. This project is located within the North Unit canal network, which is a Bureau of Reclamation Project, managed by the District.

The new flow measurement flume would consist of a prefabricated 4ft. steel ramp flume, to be built in-house by North Unit staff. A corresponding rating curve would be established for an index of flows, which will be converted to formulae for us in a PLC computer program. The measurements recorded by the PLC will be relayed along an integrated radio communication pathway, and made available over cellular networks. With this improvement to the District's flow monitoring capability, it has been estimated that tail water releases at the pipeline terminus would be reduced by 20% of the standard season average.

Project Location

NUID is in Jefferson County, Oregon and is the junior water right holder for the Deschutes Basin. Water is stored within Wickiup Reservoir to supplement natural flow, 60 miles upstream along the Deschutes River from Bend, Oregon. The District diverts water from the Deschutes River into the North Unit Main Canal (NUMC) which travels another 30 miles before arriving within the District's boundaries in Jefferson County.

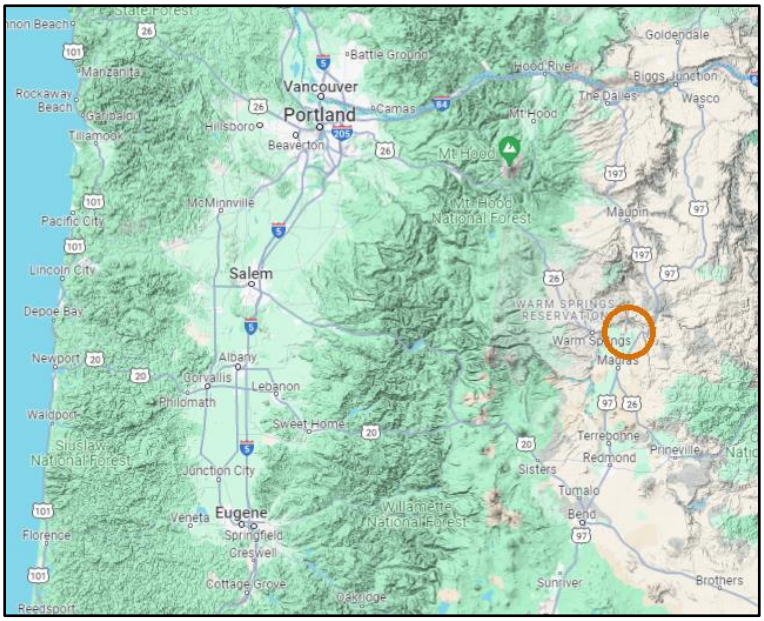


Figure 1. Location of applicable irrigable acres.

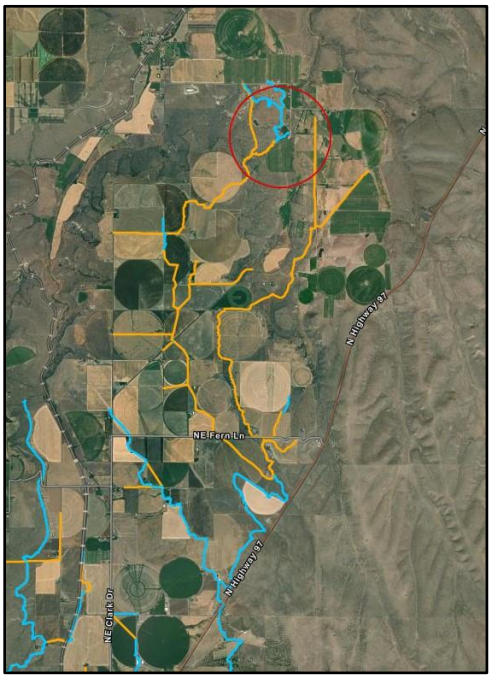


Figure 2. Location of project site.

Located at the northeast end of the District's irrigable land, is the 58-11 pipeline (orange coloration on map). The project site is adjacent to Warm Springs tribal territory near the Deschutes River, located at the upper Sagebrush Creek (a tributary to the Mud Springs drainage of the Trout Creek subbasin, which flows in the Deschutes River).

Technical Project Description

Site Preparation

This project will install a prefabricated, 4ft. generic steel ramp flume (12’ x 8’ total area) in an excavated area of open channel at the terminus of the 58-11 pipeline (see red circle in Figures 2), where the pipeline’s main outlet is 28” diameter HDPE conduit which discharges into open canal following a reduction in velocity via a pressure reducer valve. The canal is composed of earthen material and fractured basalt. There is currently no infrastructure in the target section of the channel, which is located 40 yards downstream from a Cipolletti weir that exists near the mouth of the pipeline (the weir will remain in place to be used as a redundant reference measurement). Site preparation will require small-tree and brush removal for equipment access to the channel. Excavation of the channel by a 321D LCR excavator will comprise the majority of heavy equipment use. Due to conditions of difficult access on narrow dirt roads, the 321D will need to be hauled to the site by a tractor using a 35-foot lowboy trailer. Accompanying the 321D and tractor will be a standard utility pickup outfitted with tools, concrete mix, and 3/8” rebar. The target stretch of canal for the proposed installation is ~3-4 feet, ideal for the dimensions of the flume design.

Flume Design

The design for this flume originates from a plan generated by staff member Brian Hamilton with the USBR. The flume will be fabricated in-house and installed by District employees.

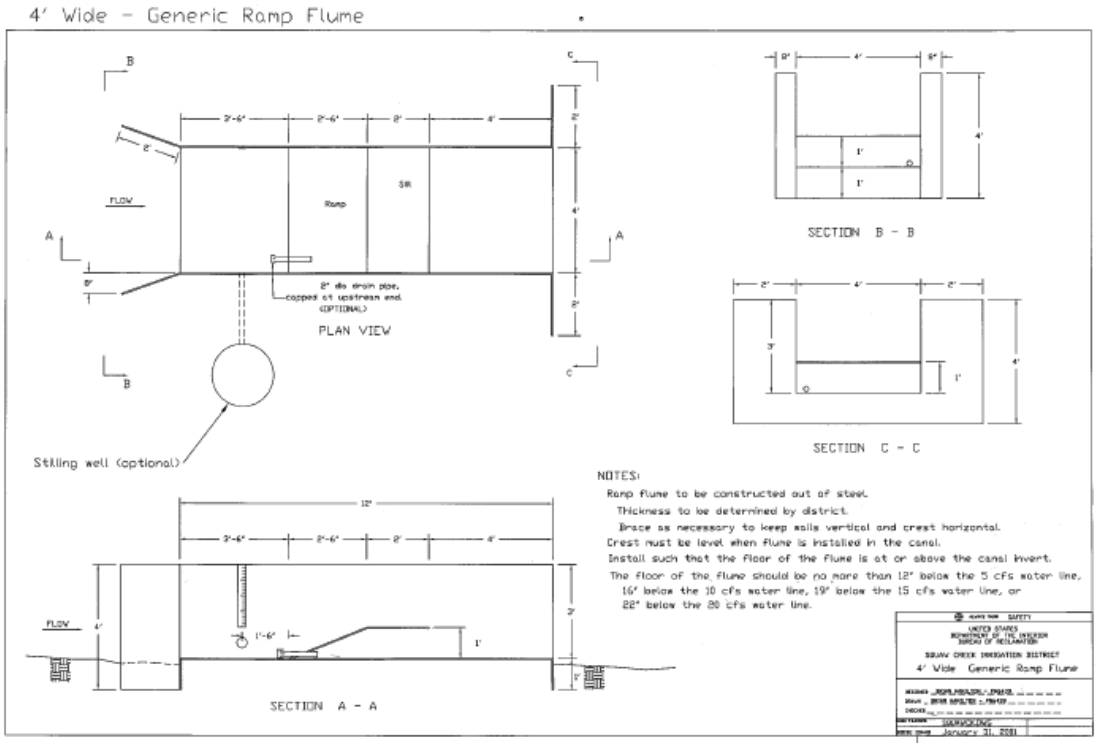


Figure 3. Design plan for flume.

Flume Construction

NUID will construct the flume in-house using 3/8’ steel. After fabrication, the completed structure will be sent to an outside vendor for powder coating. Flume fabrication will take approximately 120 hours, and powder coating will take approximately 5 days.

Automation Installation

Positioned atop the approach-section wall of the flume, a corrugated metal pipe (CMP) will be buried vertically with a NEMA enclosure fastened at the top to act as a stilling basin. The basin will house a submersible level transmitter (or ‘pressure transducer’) sensor which will measure the water level via an analog 4-20mA signal. The sensor will be wired from the sensor enclosure to the pipeline valve control substation located upstream from the Cipoletti weir. The wiring will be protected in 2-inch metal flex electrical conduit and buried to a depth of 18 to 24 inches to meet Oregon electrical code requirements. The wires from the sensor will be ported into a NEMA enclosure which houses the PLC, located inside the upstream valve control substation. The 12V power signal required by the transducer sensor will be sourced from the DC supply currently available within the valve control-system panel. To obtain a flow reading from the sensor, an AllenBradley CompactLogix PLC will control signal polling and outputting to the radio communication system that is currently available at the substation. The CompactLogix PLC requires the proprietary Studio5000 software suite from Rockwell Automation for programming and configuration. Following installation of the sensor and programming the PLC, the output signal containing the flow reading will be readable by District operations staff via an EZ-T8C-FS touchscreen Human Machine Interface (HMI) made by EZ-Automation, which will be stationed at the District headquarters office. To receive the output data signal from the flume PLC to the HMI, an additional CompactLogix PLC will need to be installed and connected to the office HMI, wherein the data signal will be received and rendered for user interaction. Moreover, the signal will be made remotely viewable on mobile devices using a multi-JCore.io RTMC cellular assembly link – one of two JCore modules will be installed at the valve substation, and the other at the pipeline headend (primary point of diversion where the 58Lateral transitions from open canal to pipeline), wherein the JCore unit receives then transmits the source radio signal from the valve substation over a cellular network.

Evaluation Criteria

Background

North Unit Irrigation District provides irrigation water to nearly 59,000 agricultural acres in Jefferson County, Oregon and serves over 900 patrons. The District is part of the Deschutes Project, which was funded and, until 1955, managed by the Bureau of Reclamation. The District primarily diverts water from the Deschutes River but supplements from the Crooked River. Since the Deschutes River is over-allocated and because the District is the junior water right holder to the Upper Deschutes River, 70% of the water diverted into the District comes from storage in Wickiup Reservoir. In recent years, both water sources have been challenged by drought and a

reduction in winter storage in Wickiup Reservoir in efforts to support endangered species habitat and life cycles in the Upper Deschutes River. Though other irrigation districts within the Deschutes Basin have experienced change because of the endangered species, no other irrigation district carries the burden more than the junior right holder, North Unit Irrigation District.

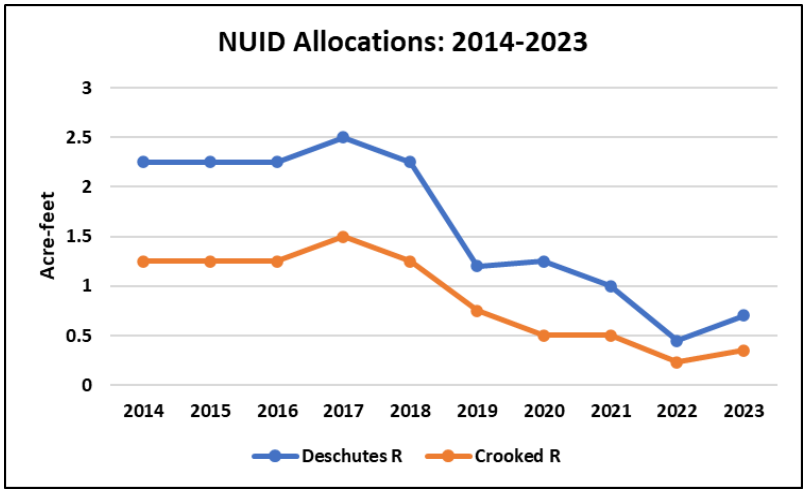
The North Unit Project spans many miles parallel to the Deschutes River, first releasing water from Wickiup Reservoir located in La Pine, OR., into the Deschutes River, which travels 60 miles to its main canal diversion in Bend, OR. Once in the main canal, the water travels 30 miles through the partially lined and open canal before crossing over the Crooked River and entering the District's irrigated agricultural lands boundary. From Wickiup Reservoir to the north end of the District, water travels over 120 miles and takes nearly four days to make the journey. The distribution system is made up of 65 miles of main canal and 235 miles of laterals. Operationally, the conveyance system is controlled via a mix of automated and manual control structures and technology. The District is a junior water right holder in the Deschutes Basin, and functions on an "on-demand" system which changes the flow rate within the system to match the requested demand of the farmers and ranchers. Because the District matches daily demand, operational staff adjust the flow rates within the system by 5-35% daily. These flow adjustments are difficult to perfect in a system that transitions from predominantly open canal to pipeline at its most northern end. Large fluctuations in demand, drastic changes in weather conditions, as well sudden operational changes impacting patrons' ability to take their ordered water (equipment failures, labor changes, etc.), can greatly influence how a target flow rate shows up downstream, especially at the terminus of a canal or pipeline. Having a consistent measurement of tail-end flows at the terminus of the pipeline will give operational staff the data they need to make more informed operational decisions upstream, equipping the District with a powerful tool for greater control over its flows.

Evaluation Criteria A: Project Benefits

The District and Jefferson County growers are affected by two types of ongoing drought:

- "Regulatory" drought, characterized by insufficient water due to regulations, primarily related to water rights and endangered species.
- "Hydrologic" drought, characterized by lack of precipitation and rising temperatures (ongoing impacts of climate change).

It generally requires 2 ¼ AF of water to grow a crop in the District. Due to regulatory and hydrologic drought conditions, NUID has had to curtail water deliveries since 2018, with a record low of ¼ of the normal allocation in 2022. That year, 40 percent of NUID's acreage was unirrigated. Water savings from this project will help protect the local agricultural economy and make Jefferson County growers – who are already innovators and early adopters of new technology and strategy - more resilient to drought.



This project will help to modernize existing District infrastructure to address water reliability concerns, making water available for multiple beneficial uses and resolving water conflict in the region. This project will support the following goals:

- **Water Conservation**: Enhance irrigation water conveyance efficiencies within the District to save ~300 acre-feet per irrigation season, reducing impacts from ongoing severe drought conditions.
- **Benefits to Water Quality**: Reduce operational spill into the Sagebrush Creek/Mud Springs tributary of the Deschutes to mitigate sedimentation and turbidity of downstream waters.
- **Benefits to Endangered Species:** Improve flow conditions for Endangered Species Act (ESA) listed Mid-Columbia steelhead trout in the lower Crooked River, and Oregon Spotted Frog in the Upper Deschutes River.
- **Achieve NRCS-approved Watershed Plan objectives:** This project directly complements specific NRCS Environmental Quality Incentives Program (EQIP) objectives outlined in the District's 2022 Watershed Plan:
    - Improved water quality, conserved surface water, improved wildlife habitat, and mitigation against drought and increasing weather volatility.

Chief among the benefits from increased water savings pertains to the 2020 Deschutes River Basin Habitat Conservation Plan (HCP). The HCP – enacted by US Fish and Wildlife Service - is a collaborative strategy to share water resources in the Deschutes Basin, covering irrigation and related water management operations while enhancing fish and wildlife habitats. In January of 2021, NUID began a 30-year implementation process of the HCP. The implementation mandates certain flow requirements for the upper Deschutes River's Spotted Frog habitat. As such, NUID is required to release and bypass water that would otherwise be stored in the winter, to enhance wintertime flows. The wintertime flow requirement is based on a multi-year step increase:

- 2021-2028 - The minimum winter Wickiup flow releases shall be 100 CFS
- 2029-2033 - The minimum winter Wickiup flow releases shall be 300 CFS
- 2034-2051 - The minimum winter Wickiup releases shall be between 500 CFS

Given these flow requirements, the District must make water-conservation improvements to its infrastructure and in its operations in order to offset these HCP flow requirements. By optimizing oversight of the pipeline's tail water, and therefore overall management of operational conveyance, this project will reduce the amount of unnecessary discharge from reservoirs during the growing season, as well as reduce the volume of water initially diverted from the Deschutes and Crooked Rivers, further supporting releases of winter time flow from Wickiup Reservoir for the endangered OSF, and help mitigate further litigation over ESA species in the Deschutes and Crooked Rivers.

Currently, the District can measure flow rate at only five locations throughout its 60-mile main conveyance canal and can be viewed as 'lacking' with regard to full monitoring and measuring capabilities. Currently, there is no method of monitoring flows on the recently constructed 58-11 pipeline. The 58-11pipeline, located at the north end of the project, spans 6 miles and delivers water to several hundred growers and ranchers. There is an 8-12 hour travel time for water released from the District's upstream re-regulating 'Haystack' reservoir, to arrive at 58-11. Water orders from growers on the 58-11 pipeline network constitute a dominant percentage of overall water ordered downstream from Haystack Reservoir, which covers tens of thousands of irrigated acreage and several hundred grower parcels. Given the complexity of its parameters and the great distance from the point-of-release, optimally managing flows at 58-11 requires high precision, proving difficult at times. Due to the remoteness of the project site, the District is only able to capture a single measurement of spill flows at the end of the day by visual inspection of a traditional Cipolletti weir. This is highly limiting because several events can occur throughout an operational day. With consistent measuring and monitoring of spill flows at the terminus, the District can more quickly respond and adapt to the above-mentioned circumstances which present themselves throughout a typical irrigation season. It is estimated that by installing a SCADA-equipped measurement flume at the terminus of the 58-11 pipeline, 150-300 acre-feet per season of unnecessary tailwater loss can be mitigated. This conserved water will be stored within Haystack Reservoir for extended use overtime, requiring less water to be initially diverted from the Deschutes River in Bend, with lesser discharge demands from Wickiup Reservoir in La Pine.

Installing a USBR-designed ramp flume with automated measurement capabilities and SCADA assets at the terminus of the 58-11 pipeline will improve the District's ability to strategically assess other locations on the pipeline network – and the entirety of the NUMC downstream from Haystack – for additional modernizations to its existing water delivery infrastructure. Real-time and historical flow data from this site will reveal analysis-based "connections" or relations between events and circumstances which occur upstream from the data source (the flume). A

particular event which occurs upstream from the data source corresponds to behavior in the data, and as such correlations can be made to adapt operational decision making or prioritize maintenance objectives and upgrades to parts of the system that are determined to be the root cause of anomalous data trends.

Finally, spill flows from 58-11 affect downstream water quality and turbidity in the Sagebrush Creek and Mud Springs drainages – tributaries of the lower Deschutes River, impacting aquatic habitat and marine life, which ultimately affect our basin partners at the Confederated Tribes of Warms Springs (CTWS), a historically underserved community who rely on the Deschutes River as a vital food source and sanctuary. Reducing spill flows will give the District greater control over its tailwaters to mitigate these impacts on the drainages and CTWS. Moreover, flow monitoring data from the 58-11 spill site will be the most informative for water management decision-making throughout the pipeline and the North Unit project, having implications for all control sites downstream from Haystack Reservoir, which include additional spill locations on other laterals. As such, the consequences of not improving measurement capabilities and water management on the 58-11 pipeline include: the continued decrease of water allotments to Jefferson County farmers, the continued spill into natural drainages at Sagebrush Creek and Mud Springs, and continued declines in water quality and watershed health due to operational spill.

Evaluation Criteria B: Planning Efforts Supporting the Project

In January of 2023, the USDA Natural Resources Conservation Service (NRCS) in Oregon released a Final Watershed Plan-Environmental Assessment (Plan-EA) and a Finding of No Significant Impact for the North Unit Irrigation District Infrastructure Modernization Project. This Watershed Plan-Environmental Assessment has been prepared under the Authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566). The Plan-EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, as amended (42 United States Code [U.S.C.] 43221 et seq.). The Plan-EA is to be considered for authorization of Public Law 83-566 funding of the North Unit Irrigation District Infrastructure-Modernization Project (Project). The Project seeks to improve water conservation and water delivery reliability in Oregon's Deschutes Basin.

The proposed 58-11 flume lends itself exactly to District initiatives and policies governing District water management outlined in the Plan-EA. As stated in section 2.1.1 of the Plan, "Water losses due to inefficient conveyance systems reduce the District's ability to deliver to its irrigators the full rate and duty associated with each water right. The District has identified that reducing or eliminating operational spills is a high priority to both conserve water and improve operational efficiencies. Details of water losses can be found in Appendix E.5 of this Plan-EA and in the District's System Improvement Plan (SIP) (NUID 2017)". By optimizing management and conveyance of operational water via 24-hour flow monitoring and measurement of the 58-11 pipeline network, the District will see lower spill waters at various termination points throughout the system, mitigate operational spill of irrigation water into natural water ways, and can achieve

lower operational water requirements to make farmer water deliveries (See Exhibit A for the 2022 Final Watershed Plan-EA).

In addition to the 2022 Watershed Plan-EA, the District also submitted its 2022 Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 086 (2002). The proposed project is directly correlated with, and a result of operational analysis within, the District's WMCP, which covers a diverse range of water objectives pertaining to specific Oregon State legislation, including *Improving Conservation Measures Currently Implemented (OAR 690-086-0250 (3)), Goals for Improving Water Conservation and Management (OAR 690-086-0250 (4)), Water Use Efficiency (OAR 690-086-0250 (5)),* and *Evaluation of Water Conservation Projects (OAR 690-086-0250 (6)).* As stated in section 2.2 of the Plan, under '*District Water Measurement Program (OAR 690-086-0250 (2))'*, "The district continually evaluates prospective locations for additional flow measurements that will improve operation and management". The District's water conveyance system is a high-fluctuation project, and recent upgrades to antiquated control structures have provided greater control over this variability, with the benefit of increased water conservation. Also, canal lining and piping projects included in the Plan are underway and with more confirmed in coming years. However, large infrastructure projects are only one part of system optimization; increased flow monitoring is the other part, but measurement stations are still sparse when one considers the size of the North Unit project. To accurately measure and monitor flows, hydraulic and hydrologic structures need to be built at targeted locations. By increasing the number of measurement sites throughout the District conveyance network, high precision flow calibrations can be made at upstream control structures to refine flow requirements along the pipeline. (See Exhibit B for the 2022 Water Management and Conservation Plan).

The District works closely with the Jefferson County Soil and Water Conservation District (SWCD). In 2020, the Oregon Dept. Of Agriculture (ODA) in partnership with the SWCD, published the 'Middle Deschutes Agricultural Water Quality Management Area Plan' (Area Plan). This Area Plan provides guidance for addressing water quality related to agricultural activities in the Agricultural Water Quality Management Area (Management Area), which includes the Trout Creek subbasin (Mud Springs & Sagebrush Creek). The Area Plan identifies strategies to prevent and control water pollution from agricultural lands. In the Area Plan, section 2.5.2 lists 'Recommended Management Practices' for the SWCD to pursue in collaboration with local farmers and ranchers. One of the primary management practices being pursued is 'Irrigation Management', the primary objectives of which include *reduce runoff, manage tailwater, and improve irrigation efficiency".* A fundamental factor driving the need to pipe the 58-11 lateral in 2018 was high turbidity and excess sedimentation within the Mud Springs drainage, as discussed in the Oregon Dept. Of Environmental Quality (DEQ) 2011 'Water Quality Status and Action Plan' for the Deschutes Basin, where sedimentation was identified as a resource issue in the Trout Creek watersheds, and where sedimentation is largely attributed to erosion from uplands

and to streambank erosion. Even though the District achieved significant reduction in operational spill from piping the 58-11 lateral, the lack of real-time flow monitoring data has prevented the District from fully realizing the water quality and conservation potential. Governing the pipeline with greater precision and efficiency with real-time flow data will help not only the District in reaching its objectives in the WMCP and Watershed Plan, but also the SWCD, ODA, and DEQ in reaching their water quality and restoration targets for the Mud Springs drainage.

Evaluation Criteria C: Implementation and Results

The scale and scope of this project is considered 'small-scale' in terms of labor and construction, relative to other projects the District is currently undertaking and has completed in the past. As such, the District has both the resources and extensive knowledge to ensure this project is executed efficiently and to a standard commensurate with USBR expectations.

Project Timeline

The project will take place in one phase during the 2024-25 storage season (October to March). The project will be performed during the non-irrigation season while the canal system is drained of water. One challenge will be to coordinate procurement with long lead items, around Reclamation award dates and purchase allowability. Procurement lead times are unpredictable, so ordering critical electrical components as soon as able will be necessary. The work will be carried out between October and February to avoid competing with season startup maintenance in March of 2025. The project will be implemented in a single phase, executed in three stages: (1) the staging, (2) the installation, and (3) the furnishing. *Staging* will include steel fabrication, earth work and small-scale excavation; *Installation* will require placement of the flume, structural reinforcement, mounting of electrical panels and laying of electrical conduit; and *Furnishing* will include the automation configuration, electrical wiring, and communication configuration. The anticipated project completion date is February of 2025.

Stage 1: Staging

- Following the end of the 2023 irrigation season in October, the canals will be drained of water, and the project site will be ready for boots on the ground. In late October to early November, the 312D excavator will be transported to the site to excavate canal banks and floor-to-grade scale. Excavation will be completed in 1-2 days under ideal conditions. Steel fabrication of the flume can begin following funding determination, as it will only take 5 days to assemble. The engineering design for the flume is fully complete and only requires assembly. Following the funding announcement, SCADA hardware will be tested, and electrical plans will be drafted during this period. Any preliminary retrofits to the current pipeline valve control substation DC power supply system will be made during this stage.

Stage 2: Installation

- Starting mid to late November, the prefabricated steel flume will be lowered into the channel, where it will be reinforced with rebar-concrete 'approach' and 'tail' sections to facilitate proper flow convergence and divergence dynamics. Design for the approach and

tail sections is pending, as the District intends to draft final dimensional specifications following funding determination; rebar-concrete construction will take 3-5 days. Once the full steel-concrete structure is completed, a 2-foot diameter CMP-tube stilling basin will be installed atop the concrete wall, set back 1 to 3-feet from the channel on the embankment. A corresponding 3-inch diameter inlet pipe will connect the channel wall to the stilling basin, and finally a steel panel enclosure will be installed atop the CMP-tube to house the level sensor; the stilling basin will take 1-2 days to complete. A 4-foot high perimeter fence will be installed around the entire structure encompassing each embankment of the channel. Inside the fence perimeter, a steel walk plank with guard-rails will be installed across the channel directly above the flume crest; the fencing and walk plank will take 2-3 days to complete. Following total completion of the flume structure, a 2-inch diameter metal flex conduit for electrical wiring will be buried between the stilling basin and a SCADA enclosure located in the pipeline substation 50 yards upstream, requiring only 4-8 hours for completion.

Stage 3: Furnishing

- Following the holiday season starting in January 2025, the water level sensor will be mounted in the NEMA enclosure atop the CMP stilling basin and wired to an AllenBradley CompactLogix PLC housed inside the valve control substation SCADA panel. At the District headquarters office, a second CompactLogix PLC will be installed in conjunction with an EZ-series touchscreen HMI for RTMC viewing over radio frequency. To achieve mobile signal access over a cellular network, 1 of 2 JCore.io RTMC system modules will be installed in the valve-control substation adjacent to the CompactLogix PLC, and the other JCore module will be installed at the 58-11 pipeline headend, whereinto the source signal from the substation will be received and transmitted over cellular networks. Following the SCADA hardware installation, the PLC's will be programmed and configured for flow monitoring and signal relaying to the HMI, using the proprietary Rockwell Automation Studio5000 software platform; the entire SCADA segment will require 5-7 days for completion. The entire project will be operational for testing in mid to late February.

The project area does not require new environmental or cultural resource compliance assessments, as the project area is contained within the District's existing easement, as well as encompassed within area scope that was assessed for the construction of the 58-11 pipeline in 2012.

Evaluation Criteria D: Nexus to Reclamation

This project improves water conservation and watershed health in the District, also as the North Unit of the Deschutes Project (a Bureau of Reclamation Project). The District receives and manages project water, though the District is still under contract with and repaying its debt to the Bureau. The project proposed is within Reclamation project lands, involves Reclamation facilities, takes place in the same basin as other Reclamation projects, and contributes water to a basin where other Reclamation projects are located.

Evaluation Criteria E: Department of Interior Priorities

The District is challenged to release more stored water to create habitat along the banks of the Deschutes River. This timing of habitat creation has created conflict because it conflicts with the District's ability to efficiently manage all its available water. However, by optimizing real-time monitoring and measurement capabilities at critical sites throughout the conveyance system, the District will more easily reach milestones in (1) offsetting storage-water demanded from Wickiup Reservoir in competition with endangered species, (2) improving management of the District's current and future water supplies, and (3) ensuring that good water quality and precision withdrawals are achieved in the Crooked River in accordance with the Middle Columbia Steelhead reintroduction. The District has been adamant toward restoring trust with local communities by seeking cooperative solutions to balance operational demands, and limit logistical barriers, for greater watershed goals. Not only will this project ensure the protection of habitat for fish and wildlife, but it will also strengthen relationships with local natural resource offices, fish and wildlife officers, water authorities and energy providers. Its value in *striking a regulatory balance* comes from this project's ability to sustain quality habitat for the ESA Middle Columbia Steelhead within the Crooked River by maintaining a constant flow on the river, while also reducing competition for stored water with the ESA Oregon Spotted Frog, because District agricultural water will be more efficiently diverted from the Deschutes and Crooked rivers. Moreover, the District's work to improve water quality in the middle and lower Deschutes River – being pursued in collaboration with the SWCD, NRCS, and DEQ - is directly tied to strengthening trust with the Confederated Tribes of Warm Springs. The District sees this project as critical to the long-term health and wellbeing of the Tribes, as the Deschutes River is a vital life-giving resource to their people and land. Mitigating irrigation water runoff into its tributaries will foster a growing partnership with the Tribes and ensure their resilience into the future. Lastly, the process of modernizing District conveyance infrastructure will improve its overall water efficiency, lower baseline operations costs, and improve its ability to effectively manage a precious water supply with respect to Jefferson County patrons and aquatic wildlife and habitat.

Sub-criterion No. E.1: Climate Change

Because the District pulls from both the Deschutes and Crooked River, water savings and improved efficiency in the District's water management abilities will benefit aquatic life in both river systems. The Deschutes Watershed is home to the threatened Oregon spotted frog, Middle Columbia Steelhead, and Bull trout protected by the Endangered Species Act (ESA). The Upper Deschutes River is home to the Oregon spotted frog while the Crooked River is home to Middle Columbia Steelhead, the endangered Bull trout, Spring Chinook Salmon, Summer Steelhead, and Redband trout. Both the Deschutes and Crooked River require a baseline minimum stream flow, temperature, and clarity to provide for these species. The threatened Oregon spotted frog has found habitat in the headwaters of the Deschutes River in Crane Prairie Reservoir and along the Deschutes River below Wickiup Reservoir. To endure the winters and successfully spawn in the spring, the frog finds a safe habitat in calm side pools along the reservoirs and rivers. These

pools are maintained by increasing winter discharge from Wickiup reservoir, or halting discharge to ensure Crane Prairie reservoir fills the calm side pools along the reservoir edges.

Similarly, the Crooked River was once a major spawning ground for anadromous fish such as spring Chinook salmon, Steelhead trout, as well as home to non-migratory fish such as Redband trout and Bull trout. The installation of Cove Power Plant on the lower Crooked River had blocked upriver migration for spring Chinook salmon until 2019, when the installation of a fish passage connected the middle-Crooked River to Lake Billy Chinook. The construction of Bowman Dam also blocked fish passage to the headwaters of the Crooked River. Though attempts have been made to install fish passage, the populations have not yet recovered. Current plans to re-introduce endangered steelhead have motivated water quality and habitat reviews of many sections of the Crooked River. The District is committed to facilitating river improvements and protecting endangered fish and wildlife by reducing the disturbance to river flow through continued improvements to its water management strategy and control infrastructure. Every acre-foot of water conserved through enhanced monitoring and control of the District's conveyance system is put back in-stream for aquatic habitat preservation.

Sub-criterion No. E.3: Tribal Benefits

Currently, operational spill water from the 58-11 pipeline discharges into the Sagebrush Creek and Mud Springs tributary. Once irrigation water reaches these natural drainages, it is no longer recoverable by the district, and instead becomes a vector for pollutant transport. Sediment, pesticides, noxious aquatic weeds, nutrients, etc. are transported in this spilled water. Excess spill water occurs due to several causes: sudden changes in demand or irrigators' ability to accept requested water, maintenance or equipment failures, weather events, large swings or fluctuations in water level due to power failures at hydro facilities, or operator miscalculation due to insufficient water data at critical points in the conveyance system. The quality of water leaving agricultural lands - high in turbidity, pesticides, nutrients - impacts sensitive aquatic ecosystems. As such, this project would produce direct benefits to the Confederated Tribes of Warm Springs, as it would mitigate adverse aquatic impacts to the adjacent Deschutes River. The Warm Springs Reservation is located just outside the northern edge of North Unit Irrigation District, the proximity of which leads to shared resources, jobs, and community. Impacts on the growers within North Unit translate to the local economy, especially the Warms Springs reservation, for it is the Deschutes River that brings us collaboratively to the table.

Project Budget

Funding Plan

The estimated **$52,777** of non-federal share of project costs will be provided from the District's general funding pool. There are no time constraints or contingencies on these funds' availability.

Cost-Share Requirements

This project will leverage **$51,286** of federal investments along with **$52,778** of non-federal investments to provide the maximum benefits to all funding partners. The District will provide **$52,778** in-kind to match the 50:50 cost share.

Pre-Project Costs

North Unit Irrigation District anticipates that this project, as funded by Reclamation, would start in October 2024 following award notice, and no pre-project costs will be incurred prior to said Reclamation funding.

Letters of Commitment

There are no 3rd party cost-share funding partners for this project. All cost-share requirements will be fulfilled by the District (the applicant).

Funding Summary

Table 1. Summary of non-federal and federal funding sources.

Funding Sources	Funding Amount
Non-Federal Entities	
1. North Unit Irrigation District in-kind contributions	$ 52,777.81
Non-Federal Subtotal	$ 52,777.81
Requested Reclamation Funding	$ 51,285.97
Total Project Funding	**$ 104,063.78**

Table 2. Total Project Costs

Source	
Costs to be reimbursed with requested Federal funding	$ 51,285.97
Costs to be paid outright by applicant	$ 52,777.81
Value of 3rd party contributions	NA
TOTAL PROJECT COST	**$ 104,063.78**

Budget Narrative

Salaries and Wages: The salaries and wages listed in the budget are the in-kind/indirect contributions from the North Unit Irrigation District. District employees will provide the labor for the construction and installation of the structures, guidance of the installation, and monitoring of the project logistically and financially. The price per hour set for District employees was based on their current wage as of January 1, 2024. Employee wages will increase on January 1 of each year of the project and based on the Collective Bargaining Agreement will increase a minimum of 2.5% to 4% based on the CPI that year.

Operations Manager - Gary Calhoun (~50 hours)
Coordinate labor and scheduling of staff and equipment for all stages of the project.

Maintenance Foreman - Lane Springer (~150 hours)
Supervise construction personnel and manage on site construction activity.

Water Master/Construction Manager - Dennis Kreuger (~150 hours)
Assist Operations Manager and Maintenance Foreman; Safety inspections and quality control.

General Manager - Josh Bailey (2 hours)
Provide general project guidance and quality-control oversight during flume installation.

Water Operations Specialist - Collin Cowsill (~60 hours)
Service-provider management of SCADA vendor; Integration of SCADA systems and monitoring technology in conjunction with vendor; Testing and troubleshooting SCADA; Record and analyze success of project;

Office and Finance Manager - Leslie Maynard (~100 hours)
Payroll and Human Resources; Grant accounting and reporting.

Fabricator – Kent Moe (~60 hours)
Flume steel fabrication and initial build prior to site construction.

Maintenance and Construction Personnel - Craig Wiseman, Marcus Schonneker, Rex Heckathorn (x3 at ~100 hours)
Heavy equipment operation and transport; Material handling; Primary on-site labor.

A per-hour estimate for each staff person's time is listed in the budget breakdown with pay rates based on current wages effective January 1, 2024.

Fringe Benefits: Hourly fringe benefit rates were calculated based on individual employee benefits. These rates will change over the life of the grant based on current rates. Fringe benefits and rates include the following:

1) FICA/Medicare tax - 7.65%
2) Unemployment tax - 0.04%
3) Workers' Compensation – 3.74% project employees & 0.12% administrative and office employees
4) 401k retirement – 5.75%
5) Health insurance – 9.43 per hour
6) Life Insurance - $0.09 per hour
7) Short Term Disability Insurance - $.21 per hour
8) Health Reimbursement Arrangement - $0.38
9) Employee Housing Benefits- $0.93 per sq. ft.

Travel: This project requires the transport of 5-6 vehicles, 18-20 miles round trip, over roughly 40 days of work. Each car uses a standard mileage rate of $0.66, at a total of 4,200 miles to be traveled.

Equipment*:* This District will use equipment owned by North Unit Irrigation District and operated by District crew members to construct the flume and canal structure. All equipment will be transported from the District's central base to the project site by Districts haulers.

Materials and Supplies: This project requires materials to fabricate the steel 4' flume structure; concrete, lumber and rebar to construct the flume approach, sidewall and tail sections; 10-gauge mesh fencing, entry gate panel, and lumber posts for the perimeter fence; walk-plank assembly; CMP steel pipe for a stilling basin; hydrostatic submersible level transducer sensor; IP6 NEMA enclosure; 18AWG shielded multi-conductor wire; 2 AllenBradley CompactLogix PLC's; Rockwell Automation Studio5000 software license; EZ-Series touch screen HMI; 2-inch metal-flex conduit for electrical wiring.

Contractual: The District will not enter into any contracts to complete this project.

Environmental and Regulatory Compliance Costs: The project area does not require new environmental or cultural resource compliance assessments, as the project area is contained within the District's existing easement, as well as encompassed within area scope that was assessed for the construction of the 58-11 pipeline in 2012.

Reporting: District staff will be responsible for the project's status reports as per the grant guidelines. The hours spent on reporting are included in the in-kind hours reported in the budget. The Office and Finance Manager will prepare the financial reports, and the Water Operations Specialist and Operations Manager will provide the progress reports.

Other Expenses: None

Indirect Costs*:* None

Total Costs: $104,063.78

Detailed Project Budget

Please refer to Table 3, which provides the detailed breakdown of all costs encountered during the project.

Table 3. Proposed itemized budget for project.

	RATE	**QUANTITY**	**UNITS**	**TOTAL COST**
PERSONNEL COSTS				
Josh Bailey, General Manager	$ 50.96	2	Hours	$ 101.92

Gary Calhoun, Operations Manager	$ 42.55	50	Hours	$ 2,127.50
Dennis Krueger, Watermaster/Construction Manager	$ 35.10	150	Hours	$ 5,265.00
Leslie Maynard, Finance Manager	$ 26.78	100	Hours	$ 2,678.00
Collin Cowsill, Water Operations Specialist	$ 28.00	60	Hours	$ 1,680.00
Maintenance - Kent Moe	$ 32.46	60	Hours	$ 1,947.60
Maintenance - Lane Springer	$ 34.74	150	Hours	$ 5,211.00
Maintenance – Craig Wiseman	$ 27.85	100	Hours	$ 2,785.00
Maintenance – Marcus Schonneker	$ 30.25	100	Hours	$ 3,025.00
Maintenance – Rex Heackathorn	$ 31.95	100	Hours	$ 3,195.00
			SUBTOTAL	**$ 28,016.02**
FRINGE BENEFITS				
Josh Bailey, District Manager	$ 50.96	2	Hours	$ 47.66
Gary Calhoun, Operations Manager	$ 42.55	50	Hours	$ 882.50
Dennis Krueger, Watermaster/Construction Manager	$ 35.10	150	Hours	$ 2,271.00
Jackie Looney, Finance Manager	$ 26.78	100	Hours	$ 1,492.00
Collin Cowsill, Water Operations Specialist	$ 28.00	60	Hours	$ 940.20
Maintenance - Kent Moe	$ 32.46	60	Hours	$ 943.20
Maintenance - Lane Springer	$ 34.74	150	Hours	$ 3,181.50
Maintenance – Craig Wiseman	$ 27.85	100	Hours	$ 2,391.00
Maintenance – Marcus Schonneker	$ 30.25	100	Hours	$ 2,322.00
Maintenance – Rex Heackathorn	$ 31.95	100	Hours	$ 1,568.00
			SUBTOTAL	**$ 16,039.06**
VENDOR COSTS				

Commercial Powder Coating, INC	$ 2,500.00	1	Order	$ 2,500.00
Rockwell Studio5000 Software	$ 2,999.65	1	License	$ 2,999.65
Steve Hills, Process Control Solutions	$ 180.00	40	Hours	$ 7,200.00
			SUBTOTAL	**$ 12,699.65**
TRAVEL				
Employee Transport	$ 0.66	4,200	miles	$ 2,751.00
			SUBTOTAL	**$ 2,751.00**
EQUIPMENT				
321D LCR Excavator	$ 50.85	60	Hours	$ 3,051.00
Service Truck (Car 27)	$ 35.65	45	Hours	$ 1,604.25
Sterling DT (Car 56)	$ 43.86	8	Miles	$ 350.88
Tractor for pulling Lowboy	$ 47.20	16	Hours	$ 755.20
Lowboy Trailer	$ 13.15	16	Hours	$ 210.40
			SUBTOTAL	**$ 5,971.73**
SUPPLIES AND MATERIALS				
NEMA Enclosure	$ 750.00	1	Each	$ 750.00
Allen Bradley CompactLogix PLC	$ 6,840.47	2	Each	$ 13,680.94
JCore.io Assembly	$ 6,172.20	2	Each	$ 12,344.40
EZ-T8C-FS Touchscreen HMI	$ 1,299.00	1	Each	$ 1,299.00
18/2 TSP Electrical Wire	$ 0.49	100	per 100ft	$ 49.20
1/2 inch Metal-flex Conduit	$ 3.00	100	per 100ft	$ 300.00
Endress+Hauser Pressure Transducer	$ 752.10	1	Each	$ 752.10
Steel 4x8x3/8	$ 452.28	10	Each	$ 4,522.80
Concrete 6 Sack	$ 312.58	6	Each	$ 1,875.48
3/8*10' Rebar	$8.98	10	Each	$ 89.80
Wire 4x7x10ga Roll	$ 23.48	5	Each	$ 150.00
Lumber 2x4x8	$ 4.70	5	Each	$ 23.50
Welding Wire .035 Spool	$ 70.00	2	Each	$ 140.00
B Wire Fence	$ 80.00	2	Each	$ 160.00
1/4 wall 4" Post	$ 14.31	120	Each	$ 1,717.20
Gate Panel 10'	$ 229.00	1	Each	$ 229.00

Walk Plank Multiple Assembly	$ 43.00	6	Parts	$ 258.00
Paint OSHA-6	$ 48.98	5	Each	$ 244.90
			SUBTOTAL	$ 38,586.32
OTHER				
Reclamation Env. & Cultural Compliance	*None*			-
NUID		**In-kind**		**$ 52,777.81**
BOR		**Federal**		**$ 51,285.97**
Total				**$ 104,063.78**

Environmental and Cultural Resources Compliance

The project will complete any environmental compliance discovered in its assessment. The proposed flume installation site resides in the area initially surveyed for the construction of the 58-11 pipeline; a previous assessment has been performed on this land to capture the historic and cultural value of the open canal network. There has also been an in-depth cultural assessment performed by the Bureau of Reclamation to capture the cultural resource of the canal network: *Sage Brush to Clover, The U.S. Bureau of Reclamation North Unit of the Deschutes Project, Volume I and Volume II.*

Conflict of Interest Disclosure Statement

NUID is not aware of any actual or potential conflict of interest that exists for this project at the time of submission.

Uniform Audit Reporting Statement

NUID submitted a Single Audit Report for the most recently closed fiscal year. NUID's EIN is 93-6001560, and it is available through the Audit Clearinghouse website.

Required Permits or Approvals

There are no required permits for this project.

Exhibits

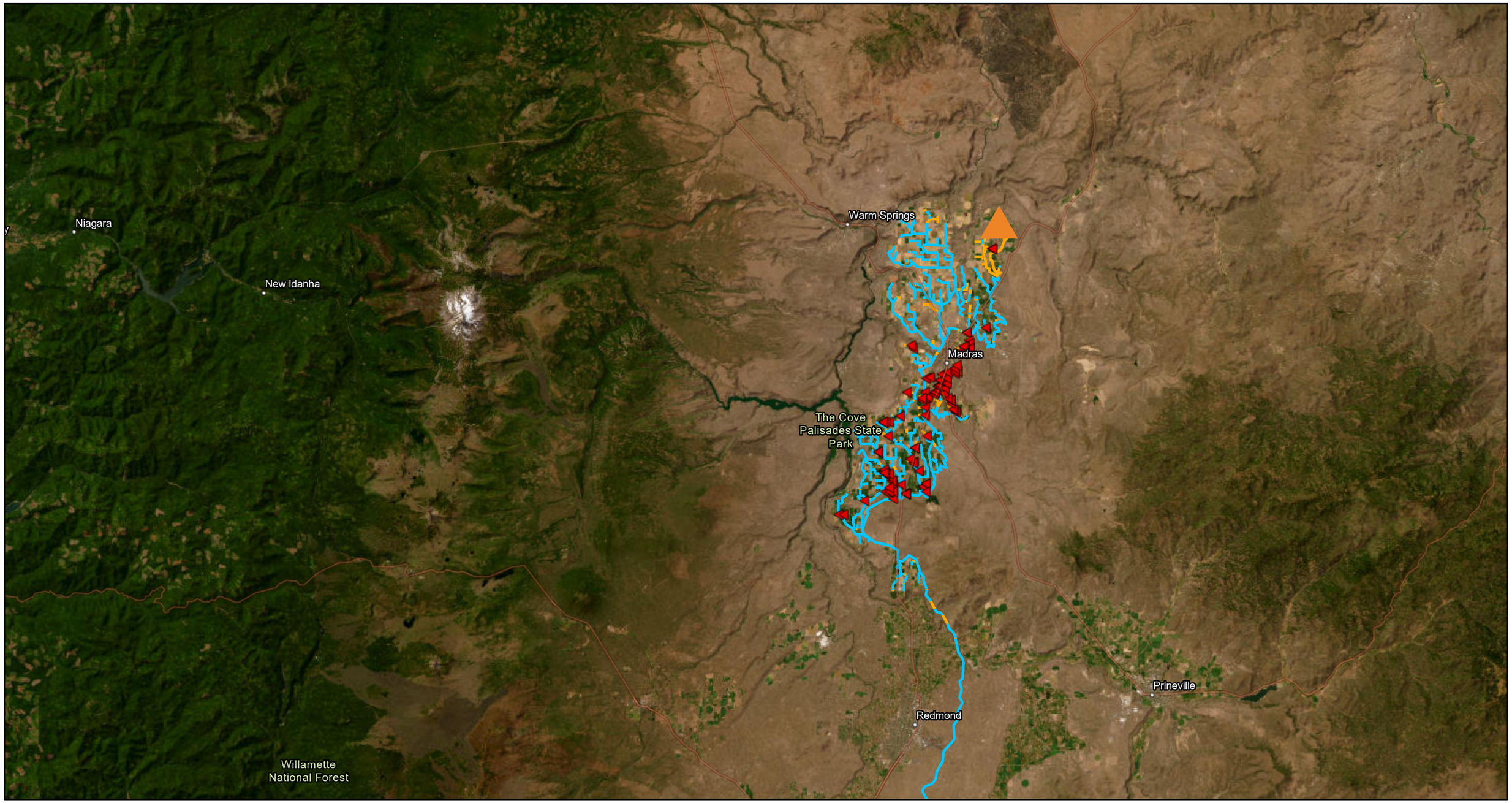
See Exhibit A for the 2022 Final Watershed Plan-EA.
See Exhibit B for the 2022 Water Management and Conservation Plan
See Exhibit C for attached letters of support
See Exhibit D for District Board of Directors Resolution 2023-03

- **Note**: Resolution 2023-03 contains old SCADA design specifications. The District has opted for an alternative SCADA vendor for 2024.

Official Resolution 2023-03

Signed during the February 14th, 2023 meeting with the District's Board of Directors (See Exhibit D).

ArcGIS WebMap



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0 5 10 20 mi

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Project Site GPS Coordinates: -121.058 44.761