

**North Unit Irrigation District
Electronic Water Orders Proposal**

**Reclamation WaterSMART Water Conservation
Field Services Grant Proposal**

December 31st, 2018



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1. Technical Proposal

1.1. Executive Summary

Date: December 31, 2018
Applicant Name: North Unit Irrigation District
City/County/State: Madras, Jefferson County, Oregon

Providing over 55% of the nation's hybrid carrot seed, and over 45% of the world's, the agricultural economy serviced by North Unit Irrigation District is valued beyond the reaches of the Deschutes River Basin. However valuable, the region is still financially limited and in desperate need of advancements to accommodate changes in watershed management. Described in the Upper Deschutes Basin Study, funded by the Bureau of Reclamation and Oregon Water Resources Department, over 100 years ago the Deschutes River was over allocated to agricultural irrigation. The region owes its foundation to the success of the many irrigation projects serviced by the Deschutes River and the subsequent agricultural economy. But in recent decades, two threatened species have been identified within the water ways, and climate change has brought years of drought and unpredictability to water supply. The irrigation districts are one of many focused on improving water management within their means to return flow to our streams.

To join partnership with the Bureau of Reclamation, North Unit Irrigation District (the District) seeks to leverage its money and resources by cost-sharing water conservation planning with Reclamation to make more efficient use of existing water supply. By modernizing our water recording process to create a real-time system optimization review, the District and its patrons can employ daily water records towards conservation planning. Concretely, the District proposes the installation of a customer portal, electronic software, field-data collection and the necessary foundational technology (here in all referred to as the *software*) to convert manual-entry water orders and bookkeeping to electronic form. Currently, district staff manually write out each daily water request called in by each farmer, and relay these orders by phone or paper card from waterusers to central office then to ditchrider and Watermaster each evening, the water requests cards are then filed away. The software will automate the water request process, sync the requests with water records and utilize this stream of real-time data to review the efficiency and management of our limited water resource. Through this portal, waterusers access real-time water order and usage data to monitor and manage their individual water accounts, allowing the patrons to make immediate decisions on which crops to plant, fields to leave fallow, and to effectively manage their farm throughout the season.

Not only will this project elevate the Districts ability to mindfully manage our water usage, but it will become the District's primary tool necessary to reach the complex water management goals and challenges held within the Deschutes Basin. The software provides a clear, real-time look at water usage within the District, and identifies potential sources of water savings. This software illuminates the way towards tactical drought resilience and conscientious water management in advocacy of the basin's watershed goals.

1.2. Background and District History

1.2.1. Area Map & Project Map

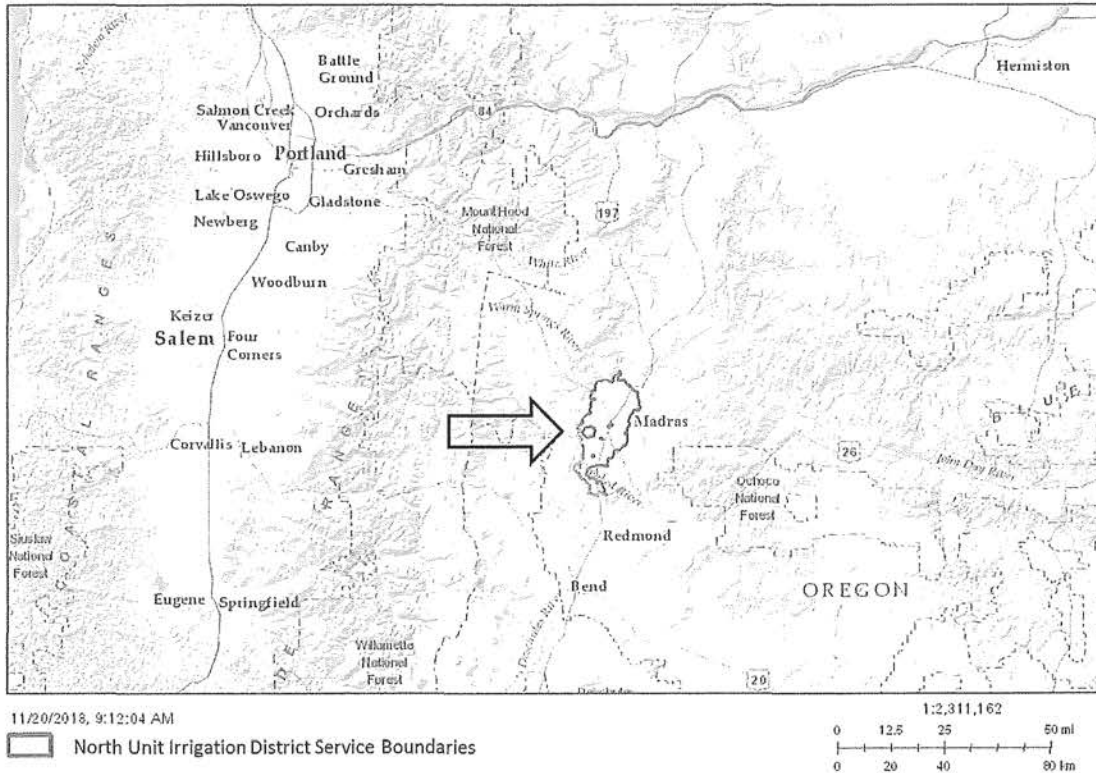


Figure 1. North Unit Irrigation District service boundaries and location within Central Oregon

Deschutes Basin Water Management

Within the Deschutes Basin, eight irrigation districts serve the water needs of their patrons by diverting water from the Deschutes River and its tributaries. The districts are local governments formed under Oregon Revised Statutes Chapter 545. They are also political subdivisions of the state of Oregon and municipal corporations. The irrigation districts deliver water to over 120,000 acres of agricultural land throughout the basin.

The porous, volcanic soils of the Deschutes Basin cause a significant portion of the water that flows through irrigation canals to seep into the ground. Approximately 50% of the water that is diverted from the river is lost due to seepage from canals and cannot be used for irrigation. This means that the irrigation districts who manage these canals must divert twice the amount of water that they need to serve their patrons' needs for irrigation water.

Past water conservation efforts have reduced the amount of water diverted from the river; however, two endangered species protected in this basin require substantial return to natural river flow, beyond what can effortlessly sacrificed by the districts. Therefore it is pertinent that strides towards water efficiency by all irrigation districts are made to meet the increasing ecological needs of the basin.

1.2.2. North Unit Irrigation District Infrastructure, Water Supply and Water Rights

North Unit Irrigation District uses water from the Crooked and Deschutes Rivers to serve approximately 59,000 acres of productive farmland. The District's lands are predominately in Jefferson County, Oregon. Water is delivered through a network consisting of 65 miles of main canal and 235 miles of laterals and sub-laterals. Of the total area served, approximately 53,672 acres receive their primary supply from the Deschutes River and the remaining 5,228 acres receive deliveries from the Crooked River. A total of 940 landowners receive water from the District. Principal crops produced by District farmers include irrigated pasture, hay, alfalfa, wheat, garlic, grass seed, and vegetable seed. The District is most well-known for hybrid carrot seed production, providing over 55% of the nation's and 45% of the world's hybrid carrot seed. North Unit Irrigation District's 2012 Water Conservation Plan documents that on an average year, with an estimated 58% district-wide, on-farm efficiency, supply averages 111,589 AF for a demand of 190,217 AF, signaling that additional irrigation water supply of approximately 78,628 AF would be necessary to meet the on-farm crop use for the total acres.



Figure 2. Overlooking one of many hybrid carrot seed fields in North Unit Irrigation District, Mt. Jefferson can be seen to the west.

Deschutes River Water Supply

Water from the Deschutes River is supplied by a diversion in Bend, Oregon that diverts water into the North Unit Irrigation District Main Canal. The canal was built in the mid-1940s by Reclamation and transferred to the District to manage and operate shortly thereafter. The North Unit Main Canal is approximately 65 miles long, starting at the diversion dam in Bend and heading generally in a northerly direction before terminating just north of the town of Madras. The canal was built for a maximum capacity of 1100 cubic feet per second (cfs). Because water diverted from the Deschutes River can be delivered by gravity, the District does not incur any pumping costs associated with these water rights.

North Unit Irrigation District's principal water right from the Deschutes River is described in Certificate 72279. It certifies the right to divert water from the Deschutes River, Wickiup Reservoir and Haystack Reservoir to irrigate 49,916 acres, with a priority date of February 28, 1913. The District is the junior water right holder on the Deschutes River and as such, relies more heavily on stored water than other irrigation districts in the basin. Based on historic averages of water diverted from the Deschutes River at Bend, roughly 30% of the water is from the District's natural flow water right and 70% is from stored water originating in Wickiup Reservoir. Wickiup Reservoir has a maximum capacity of 200,000 AF and reaches full fill in approximately seven out of ten years. The regulation of basin reservoirs including Wickiup

Reservoir was adapted in 2016 to create habitat for the Threatened Oregon Spotted Frog (OSF) protected by the Endangered Species Act. Such changes have altered the timing and storage available to the District throughout the year. In years that the reservoir does not fill and with changes to discharge rates for the OSF, the District must employ a number of drought management strategies including additional supplemental pumping from the Crooked River, land fallowing, and deficit irrigation practices to meet patron needs.

Crooked River Water Supply

In 1968, the District constructed a pumping plant adjacent to and at the point where the Main Canal crosses the Crooked River. The primary purpose of the plant is to furnish a supplemental water supply, when needed, by pumping from the Crooked River and discharging into the Main Canal. However, the plant also provides a primary water supply to approximately 9,000 acres of land, which are spread throughout the district. The plant consists of nine vertical shaft pumps with a total capacity of 200 cubic feet per second at a total dynamic head of 150 feet. Each pump is powered by a 450-horsepower motor that pumps the water into a 96-inch steel-pipe discharge line 220 feet long. The power for the pumping plant is supplied under contract by the Central Electric Cooperative.

The District uses water from the Crooked River under four water right certificates (cert. 72281, 72282, 88876, and 88877). Pumping water from the Crooked River canyon costs approximately \$19.13 per acre foot in electricity charges due to the change in elevation between river and canal. Pumping costs have exceeded \$300,000 during the 6-month irrigation season and rates are expected to increase significantly in the future.

1.2.3. North Unit Endangered Species Preservation

There are two pivotal species protected by the Endangered Species Act within the Deschutes Basin that have altered water management for all: the Middle Columbia Steelhead and the Oregon Spotted Frog. Cascades Eastern Slope Tributaries is a Major Population Group (MPG) of Middle Columbia Steelhead. Three Distinct Population Segments (DPS) of this MPG exist in Deschutes Basin: 1) Deschutes River West Side, 2) Deschutes River East Side, and 3) Crooked River (extinct). The Oregon Spotted Frog, listed as threatened in 2014, depends on habitat in Oregon, Washington and California. Within Oregon, that habitat largely expands along the Deschutes River upstream of Bend to the headwaters; including irrigation storage reservoirs Wickiup and Crane Prairie Reservoir.

The Middle Columbia Steelhead spawn high in the headwaters of the Columbia River tributaries and migrate out to the ocean to grow. The construction of dams in nearly every major tributary to the Columbia River Basin have blocked the Steelhead's ability to migrate to secure headwaters for spawning. In 2005, the species was listed as endangered; and with it brought the resolutions of higher instream flow, fish screens on major diversions and fish ladders over instream dams. Because the District pulls both from the Deschutes River and the Crooked River, the District has actively oriented its objectives to conserve water and return water savings to improve instream flow resulting in enhanced ecological conditions for Steelhead migration, spawning and rearing.

The Oregon Spotted Frog has specifically affected the water management strategy of the irrigation districts in the basin because their habitat overlaps key basin storage reservoirs. In 2016, a new Operations and Monitoring Plan for both Wickiup and Crane Prairie Reservoir were

implemented to adjust dam operations, release timing, and instream flow goals of the headwaters in creation of habitat for the Oregon Spotted Frog. The plan provided a minimum of 100 cfs discharge from Wickiup Reservoir during the winter, at least 600 cfs from April through June, and at least 1000 cfs June through September. The creation of habitat has been highly successful; however, it has redistributed the volume of accessible water for irrigation over time. The District has remained supportive and adaptive to the needs of the Oregon Spotted Frog; but the weight of these operational changes upon the District necessitates a reconstruction of the District's water management strategies.

1.2.4. North Unit Bureau of Reclamation Partnership

In the early days of North Unit Irrigation District, the area was devoted exclusively to grazing. In early 1900, dryland wheat farming gradually replaced grazing until the area was nearly all under dryland wheat cultivation and the land was settled in large holdings. The first serious study for irrigation to the North Unit area was undertaken jointly in 1913 by the State of Oregon and the Bureau of Reclamation. But the project faced many financial and political barriers until the election of Franklin D. Roosevelt in 1932; Roosevelt's "New Deal" emergency relief program brought a tide of New Deal dollars into the agency coffers. Soon after the Bureau of Reclamation re-surveyed the project in 1934, construction on the North Unit Project began in 1938. The project was designed to create storage in the Wickiup Basin located approximately 45 miles southwest of Bend, with the Deschutes River transporting water until meeting the North Unit Main Canal diversion in Northern Bend. The main canal water then flows approximately 65 miles north, passing over both the Crooked River Canyon and Willow Creek Canyon by flume and syphon and through Smith Park State Park by two tunnels and a syphon. Because of the inherent change in elevation, from storage to tail end of the project, no pumps or energy was required to transport the water.

Construction on the project began simultaneously at Wickiup Reservoir and along the main canal in 1938. During World War II construction was halted, however water was delivered to 17,000 acres in 1946 and 1947. Wickiup Reservoir was first completed in the 1947, though leaking. After the end of the war in 1949, the leaks from Wickiup Reservoir had been repaired and the entire project was fully complete and deliveries were made to all of the 50,000 acres that spring. The project totaled 65 miles of main canal and 235 miles of laterals.

Though gravity fed, the District found their ability to efficiently manage water delivery was limited by only having Wickiup Reservoir as their point of control. Changes in discharge flow out of Wickiup Reservoir took nearly two days to arrive at the North Canal Diversion, which promoted farmers to over-order water in anticipatory planning. In 1951, the Bureau of Reclamation investigated the feasibility of a reregulating reservoir within the district to reduce the time between water orders and delivery, and provide the District the tools to more precisely manage ordered water. By 1957, the 105-foot-tall by 1200-ft-long earthen dam, Haystack Dam and Reservoir, was constructed at mile-marker 43 providing over 5900 acre-feet of tactile storage.

After several dry years resulting in water shortage for the North Unit farmers, in 1968 the District paid for and constructed a nine-unit pumping plant on its own to supplement flows in the main canal with water from the Crooked River. The Crooked River Pumping Plant is situated on

the river a short distance above the Crooked River Flume. The installation of the Crooked River Pump Station delineates the projects designed to establish the water supply to the District, and projects designed to improve the water efficiency within the district delivery system.

The District has participated in numerous water conservation projects with Reclamation's financial support. Recent projects are summarized as follows:

In Progress

2015-2019 – Phase II (R15AP00109) - North Unit Irrigation District piped the remaining 3 miles of a 5 miles of sublaterals 58-11 and conserved 380 AF of canal seepage per season in three phases. The saved water was again returned to the Crooked River in an effort to increase water quality and quantity for Middle Columbia Steelhead reintroduction.

Reclamation Funding: \$704,478

Completed

2012-2016 - Phase I (R12AP13010) - North Unit Irrigation District piped first 2 miles of a 5 miles of sublateral 58-11 and conserved 380 AF of canal seepage per season in three phases. The saved water was again returned to the Crooked River in an effort to increase water quality and quantity for Middle Columbia Steelhead reintroduction.

Reclamation Funding: \$942,982

2015-2017 - Haystack Ramp Flume (R15AP00054) - Funding for BOR Water Conservation grant and Apple, Inc. to install a ramp flume below the discharge at Haystack Reservoir for water measurement.

Reclamation Funding: \$18,337

2011-2016 – Central Oregon Irrigation District (COID) I Lateral (R12AP13009) - Funding for BOR WaterSmart grant, OWEB and Pelton Fund to pipe a portion of COID's I Lateral. The conservation water from this project will be transferred to NUID lands with Crooked River water rights. Crooked River water rights will be transferred instream as described in the Main Canal Lining Project Below.

Reclamation Funding: \$600,000

2011-12 – North Unit Irrigation District Energy and Conservation Initiative (R11SF80303)- Line approximately five miles of its Main Canal and conserve up to 7,880 acre-feet (AF) of water from the Deschutes River. The saved water will be used to irrigate lands currently supported by water that is pumped from the Crooked River. The Crooked River water rights displaced by the new water resulting from the lining project will be retired to support water quality and fish habitat improvements in the Crooked River.

Reclamation Funding: \$1,000,000

2011 – 58-9 Surge Pond (R11AP1C008) – Construct a surge pond at the confluence of Lateral 58-9 and Lateral 58-11 to improve water management capacity. The surge pond is designed to hold 25 to 30 acre feet of water and will be utilized to catch irrigation water surges in the system and utilize the water for irrigation rather than allowing it to flow off the irrigation district and carry excess sediment into the creeks, degrading critical fish habitat.

Reclamation Funding: \$130,000

2010 – Haystack Flow Measurement (R10AP1C052) – Install a Horizontal Acoustic Doppler Current Profiler within the district’s easement near the base of Haystack Dam just downstream where the bypass chute and Haystack discharge come together.

Reclamation Funding: \$10,899

2010 – Modernization of the Bend Diversion (R10AP1C006) NUID will replace and/or install at the headgate, river site, flow monitoring station and the canal site flow monitoring station SCADA Programmable Logic Controllers, river/gate position sensors, and cellular modem to communicate data.

Reclamation Funding: \$31,016

2009 – WCFSP Lateral 58-9 Piping Phase II (09FG1U1446) Install 22,000 feet of pipe to provide improved water management; eliminate soil erosion; pressurize a portion of the water delivery system and improve water quality.

Reclamation Funding: \$318,663

2009 – WCFSP Ramp Flume – Lateral 58 (09FG1U1421) Install a ramp flume on Lateral 58 to for more accurate measure of water at the head end of the lateral to conserve an estimated 900 AF of water per year. (Revised to installation of an acoustic Doppler)

Reclamation Funding: \$16,270

2008 – WCFSP Pipelines 41-6 Lateral and 43-7-1 Lateral (1425-08-FG-1L-1350) Convert sections of two earthen ditches to pipe to conserve water by reducing seepage and evaporation losses.

Reclamation Funding: \$38,906

2007 – Water 2025 Challenge Cost Share Program, Lateral 58-9 Pipeline Phase I – improve Lateral 58-9 by converting one half mile of open earth ditch to two parallel pipes to conserve water and thereby increase available water supplies associated with Reclamation’s Deschutes River Project.

Reclamation Funding: \$237,002

2007 – Water 2025 Challenge Grant, Telemetry & Action Plan. Partner with 5 other irrigation districts in Central Oregon to install flow measurement telemetry stations at 18 strategic locations across the 5 districts to measure the benefits of water conservation. Two sites were installed on the district.

Reclamation Funding: \$8,818

2007 – Piping Laterals 53, 58-13 and 63-1. Upgrade 3 laterals from open ditch or leaking pipe to plastic pipe to conserve water, increase water use efficiency and enhance water management.

Reclamation Funding: \$55,410

2006 – Lateral 58-3, pipe 1,800 feet to conserve water and enhance on farm irrigation efficiency.

Reclamation Funding: \$20,017

2005 – Water 2025 GIS and Aerial Imagery Consortium: Using Technology, Best Practices and Information System Management to Support Conservation Program Development and Implementation.

Reclamation Funding: \$25,000

2005 – Automation and Telemetry Financial and Technical Assistance to install telemetry at Haystack Reservoir, 58 lateral turnout, 37–6 lateral and 58-11 lateral to conserve water and enhance water management through automation.

Reclamation Funding: \$24,100

2004 – Lateral 51-1, piping approximately 3,500 feet of the distribution system to prevent seepage losses and soil erosion.

Reclamation Funding: \$11,470

2004 – Lateral 58, this project included 6,600 feet of pipe and abandon a section of lateral that passes through an industrial park. This piping project saved water and prevented soil erosion by decreasing canal seepage. Abandoning the section through the industrial park will kept runoff from parking lots and roofs from entering the irrigation system.

Reclamation Funding: \$66,972

2003 – North Unit Small Pipelines 2003 – piping of various short sections of canals in the distribution system to prevent erosive destruction of the canal banks by livestock and to save water. The project included installation of three pipelines for a total of 6,291 feet.

Reclamation Funding: \$38,000

2002 – Lateral 58-1, pipe approximately 5 miles of open canal to save water and reduce soil erosion by decreasing canal seepage.

Reclamation Funding: \$107,188

1998 – Lateral 51-4, demonstration high head pressure pipeline system, installation of 25,000 feet of pipe to enclose an open canal.

Reclamation Funding: \$105,000

1995 – Lateral 52, installation of 12,500 feet of pipe to enclose an open canal.

Reclamation Funding: \$126,000

1.3. Technical Project Description

1.3.1. Project Background

Aging agricultural infrastructure, an expanding population, persistent droughts, and r Endangered Species Act regulation are stressing scarce water resources in the Deschutes River Basin. The many canals and dams upon which farmers depend to deliver their irrigation water is highly inefficient; losing 30-70% of water via seepage. In many scenarios, farmers and rivers do not get the water they need. As described in the Deschutes Basin Study, the District's System Improvement Plan and the 2012 Water Conservation and Management Plan, piping the miles of open earthen canals is the planned solution to eliminate seepage and improve water efficiency within the irrigation district's distribution system. For the District, it is estimated to cost \$809 million dollars to pipe the remaining 85% of open, un-piped or lined canals. Prioritizing these piping projects by need and finding other immediate water-savings projects can only be achieved through a detailed, system review. Rather than constantly hiring costly consultants to take detailed snapshots of how the system is functioning at one point in time, the District proposes using the flow data already collected daily and put the data to good use. The ditchriders already actively record the flow rates and distribution of water throughout the system, collecting over 100 data points per day. By collecting this data in a central, analyzable database, we will have a clear temporal and spatial review of water usage within the district and from there informs the prioritization of future conservation projects.

Current Operations

True to irrigation tradition, the District receives water requests by phone from our patrons. District staff records the request by hand on a paper card and relays the request to ditchriders each evening in preparation for delivery the following day. The requests and subsequent

deliveries are accounted by hand by each ditchrider and entered manually into the computer at the end of each month. During this process, patrons are unable to see or accurately track their water usage in between monthly data entries. The system relies heavily on the District's labor, exposes the District to liable errors, fails to meet the needs of the patrons, and stunts the District's ability to plan and manage water usage within the district with real-time data. The process includes the collection of hundreds of data points each day that has been historically filed away; if analyzable, the data can guide the District in conservation projects, system improvement plans, drought resilience, patron education and water management planning, and District water supply planning and anticipation.

As described in the Upper Deschutes Basin Study, there is a strong call for more efficient water usage by the irrigation districts, and focused efforts to pipe the irrigation canals in efforts to protect endangered aquatic species and endure the more frequent drought conditions facing our watershed. The software provides a clear view of how water is used by our District and dependent farmers; and provides the district with the navigational guide to prioritize conservation projects within the district and more effectively apply time and resources.

1.3.2. Project Plan of Action

Installing the Electronic Water Order Software

The installation of the electronic water order portal comes with many necessary upgrades to the District. Prior to the software launch, the central office computers, server, router and iPads will be installed to support the processing and memory demand. For customers to gain access to the electronic water order portal, the website will also be updated weeks prior to launch. The electronic water order software will be installed and customization to the district will commence. Software design will include specific water operation details, turnout GPS location, patron and water right information water usage by user, by turnout, by lateral, sub-lateral and by ride. Troubleshooting will start four weeks prior to launch, to ensure water operations and customer portal is running properly. The customer portal will be launched the first week of the irrigation season which can also be defined as the first week of data collection.

While in operation, both patrons and staff will enter water orders, water deliveries and system measurements on a day to day basis into one central database. No longer will patrons be calling in from their farm fields between 6:30 am and 5:00 pm to the office. Nor the water requests quickly scribed onto stacks of water order cards, susceptible to loss without a trace. Farmers will enter their orders online, even schedule their requests ahead of time when possible. All water requests will lock into place the evening before the date of the request, and the software will provide the ditchriders with a definitive route and schedule for the day. As ditchriders enter the flow rates for their laterals and sublaterals, water usage on a spatial and temporal scale will be collected throughout the irrigation season. With this database, the district will gain operational leverage to better manage current deliveries, anticipate water demand, and identify problematic sections within the district to guide project prioritization. The results will be reviewed every fall following the finality of the irrigation season. Winter repair and future projects will then be prioritized and goals for the following seasons and years defined.

Table 1. Project Milestone Timeline

Task	Nov 2019	Dec 2019	Feb – Mar 2020	April 2020	April 2020 - Oct 2020	Oct 2020	Dec 2020
Commence Fiber line Installation	X	X	X				
Install Office Hardware	X						
Update and Launch Website		X					
Software Design	X	X					
Software Troubleshoot			X				
Launch				X			
Data Collection				X	X	X	
System Improvement Prioritization						X	
Conservation Goal Creation							X

2. Evaluation Criteria

2.1. Evaluation Criterion A: Association to Reclamation Project Water Supplies

North Unit Irrigation District was formed as an Oregon municipal corporation in 1916 to investigate, build and finance an irrigation project. The system was built by the Bureau of Reclamation (BOR) with North Unit Irrigation District acquiring the project from the Bureau of Reclamation in 1954. The system, also known as the Deschutes Project, included the construction of Wickiup Reservoir, Haystack Dam and Reservoir, the North Unit Main Canal, and associated delivery facilities. The BOR still supervises the District’s safety practices and management of the Wickiup and Haystack Dam.

Alterations to the Wickiup Reservoir management strategy in protection of the critical habitat for the threatened Oregon Spotted Frog have challenged the stability of water supply to the District. Increased discharge during the non-irrigation season or low demand months (October-April) diminishes the available supply for high demands months (May-September). During the fall of 2018, the available stored water within Wickiup Reservoir approached historic lows. The volume had not dropped to 1% capacity since the 1970’s; and no known records could guide the watermasters or damtenders at which point the dam would reach dead pool or cause damage. The irrigation districts needed a more concrete idea of the potential water demand to guide water management decisions.

2.2. Evaluation Criterion B: Water Management Plan Completion Update

The software's targeted functionality aligns with the District's internal and external conservation objective necessary to meeting evolving water management goals within the watershed. The District has been aggressively pursuing sustainable planning efforts to improve system operations and efficiency within the district, and public relationships and watershed health outside of the district. The projects are oriented by the 2012 Water Management and Conservation Plan; and view the software as a tool to reach current short-term objective and create future goals in preparation for the 2020 plan update. The Water Management Plan focuses on, but it not limited to, pursuing conservation measures, maintaining irrigation acreage base, investigating computerization of field data, improving customer service and modernizing the distribution system through piping and lining. The 2020 updates must reflect the District's renovated strategy towards balancing the needs of the species protected by the ESA as well as the District's agricultural longevity.

2.3. Evaluation Criterion C: Proposed Analysis to Action Plan

By installing this software, the District will have data to guide the updates to the water management plan. Though short, this will provide the District, and individual water users, with a candid review of the programs water management success; the fine-scaled review has unmatched value for the District as we redefine our focus and strategy for the next decade and beyond. After which point the software becomes a yearly analysis tool to improve the efficiency of water operations and prioritize the projects defined by our System Improvement Plan. The installation of this software not only addresses existing goals defined in the 2012 Water Management and Conservation Plan, but it will inform updates to the plan for 2020 and orient piping projects defined in the System Improvement Plan. Defined within our water management plan, the district seeks to refine and develop a detailed data base and map of the district. This map will include the location and elevation of all laterals and the canals, water control structures, flow measurement sites, brides, point of spill, points of delivery, including all irrigation lands, and whereby the district can determine high priority areas and projects for implementation. The District has already begun aspects of this objective but has yet to include the input of patron census data and real-time flow data during the irrigation season. The inclusion of these two layers elevate the utility of this data beyond a two dimensional map of structures. It creates an analysis of water demand, distribution and efficiency across time and space.

2.4. Evaluation Criterion D: Reasonableness of Cost

The project is estimated to cost \$69,841.61 for the initial installation of all hardware, licensing, and software implementations. It is estimated that the District will save \$67,000 per year for the labor and supplies involved in the completion and review of hand-written water records, hand-written water requests, and telephone communication of daily water requests/status. Other types of water software were explored, some of which costing \$45,000-100,000; however, these software were not as effectively customizable to our system and provided more than what was necessary.

2.5. Evaluation Criterion E: System Optimization Review Addresses Water Resource Challenges

Now more than ever, the District needs a focused eye on every drop of water diverted into the district. Both the Deschutes River and Crooked River are not only over-allocated but also

support two threatened species protected by the Endangered Species Act: the Middle Columbia Steelhead and the Oregon Spotted Frog. And as watershed goals seek to return more water to instream flow for successful reintroduction, climate change has challenged efforts with dry winters, low snow pack and hot summers. Water management plans protecting the threatened species will likely govern the instream flow and also the year-round reservoir management plan. In lieu of natural stream flow, dependence on stored reservoir from Wickiup Reservoir is not as dependable of an option as originally intended. Increased reservoir discharge during non-irrigation months has diminished the stored supply and shifted the relative proportion and timing that the District diverts from the Deschutes versus Crooked River. The project seeks to improve external relations and watershed management by providing the insight to adjust daily, water operations strategies responsible for balancing source water diversion and storage release.

In order to address all of these competing challenges, the District must evolve their water management strategy internally. The water software will guide prioritization of internal projects to pipe and optimize our distribution system. The System Improvement Plan defines the engineering considerations involved in piping the remaining 85% of open canals but more can be done in the interim. This software identifies problematic regions in the district and provides the District with the insight to assess the level of resolution required to improve efficiency. The District will be facing decades of piping projects to mediate diminished water supply resultant of the new water management plans, over-allocation and climate change. The software helps prioritize problematic regions, which will increase the water-savings per dollar possible by each project and give the District the insight to make cost-effective changes in water operations in between piping project. And provide a method by which the waterusers can evaluate individual conservation or savings and survey water management within the district across space and time.

2.6. Evaluation Criterion F: Need for Federal Funding

Outside of grant funding and a small royalty from hydro facility, the District depends heavily on the patrons for funding. There have been multiple explorations into hydropower across the Deschutes Project; however, the deterrents of high risk and financial loss halted their pursuit. The District is limited financially by the stability of the agricultural economy of the region and does not intend to force the burden on the patrons when opportunities exist elsewhere. The patrons of the District already face the highest cost (per dollar) for water among all the irrigation districts in Deschutes Basin, increasing the rates further is not feasible or sustainable for farmers to continue growing crops.

2.7. Evaluation Criterion G: Amount and Source of Non-Federal Funding

2.7.1. Cost-Share Requirements

This project will leverage \$25,000 of federal investments along with \$44,841.61 of non-federal investments to provide the maximum benefits to all funding partners. The District will provide the \$44,841.61 to match the 50:50 cost share requirements in the form of cash funding and in-kind staff resources supported by district assessments. Of the \$44,841.61, in-kind contribution makes up \$16,157.61 and the remaining 28,684.00 as cash from the District.

2.7.2. Pre-Project Costs

NUID anticipates that this project, as funded by Reclamation, will start in 2019. Initial installation of computer hardware, update website and begin software customization in time for launching 2019 irrigation season.

2.7.3. Funding Partners

NUID expects to only partner with the BOR on this project.

2.7.4. Other Federal Funds

No federal funds have been requested or received from other sources.

2.7.5. Pending Funding Requests

NUID has not sought funding elsewhere and has no pending funding requests.

2.7.6. Funding Summary

Table 2. Summary of non-federal and federal funding sources.

Funding Sources	Funding Amount
Non-Federal Entities	
1. North Unit Irrigation District*	\$16,157.61
2. North Unit Irrigation District	\$28,684.00
Non-Federal Subtotal	\$44,841.61
Requested Reclamation Funding	\$25,000.00
Total Project Funding	\$69,841.61
*indicates in-kind contributions	

2.8. Evaluation Criterion H: DOI Priorities

2.8.1. Subcriterion No. 1— Creating a conservation stewardship legacy

The District seeks to utilize science (modeling data) to identify best practices to manage water resources throughout the watershed. Findings from this software will help guide the advancement of our Water Management and Conservation Plan and inform priority of System Improvement Projects within and outside of the District. Specifically from these best practices, and analyzed data captured by the software, we will review the water storage, transportation and distribution systems and identify opportunities to resolve conflicts regarding over-appropriation of the Deschutes and Crooked River, storage in Wickiup Reservoir, and ESA requirements affecting the Oregon Spotted Frog and the Middle Columbia Steelhead.

2.8.2. Subcriterion No. 2— Restoring trust with local communities

Like many irrigation districts, the local community is a compilation of urban and rural stakeholders; this project is designed to facilitate connective communication and provide real numbers behind our sustainable enterprises. As the general public joins the initiative to protect endangered species, recreate on the rivers and reservoirs, and expand out into agricultural communities, irrigation districts have become misunderstood, as we divert significant volumes of water from the river. It is upon the District to ensure the farmers' story is told; the trust from the community will return when the District is provided a platform of communication to the public.

The District already has a rich history of sustainable piping projects, collaborative initiatives with fellow irrigation districts, watershed councils, and coalitions. This software will be paired with a renovated website that will improve the credibility and means of communication to the public. The customer portal will also act to connect the patrons to the District and further deepen the trust and reliance in the District by the patrons. And with these open portals of communication, the District seeks to provide hard, defensible results justifying our evolving water management strategy.

3. 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 in the installation of the software and monitoring of the data. The price per hour set for District employees was based on their current wage as of October 30, 2018. Employee's 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.

District Manager, Mike Britton will manage the project for the District. The Operation Manager Gary Calhoun, Watermaster/Construction Manager and Water Operations and Special Projects Coordinator Lisa Windom will manage the day-to-day operations. The Water Operations and Special Projects Coordinator will also guide the specialization of the software to the district, coordinate its installation and train personnel through the transition. The Office Manager Marlene Lloyd and Water Records Clerk Sue Levitt will complete the necessary grant paperwork. An estimate of hourly time is listed in the budget breakdown with an hourly rate based on current wages effective October 30, 2018. The administrative and office wages usually increase January 1 of each year based on the CPI.

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 - .01%
- 3) Workers' Compensation – 4.28% project employees & .14% administrative and office employees
- 4) 401k retirement – 5.75%
- 5) Health insurance - 7.80 per hour
- 6) Life Insurance - \$.09 per hour
- 7) Short Term Disability Insurance - \$.16 per hour
- 8) Health Reimbursement Arrangement - \$.38

Travel: The project does not require travel as it is an internal operation.

Equipment: No equipment is required for installation.

Materials and Supplies: In order to update central hardware the purchase of the following is required: one PowerEdge T330 server with 2012 r2 install, eight Precision Tower 3000 series computers, one Ubiquiti Wi-Fi adaptor, ten Microsoft SQL Server 2016 software customer access licenses, one Sonicwall TZ300 router, two replacement drives to relay and run Storm Auxiliary Ditchrider software. The Auxiliary Ditchrider software requires 12 iPads with cellular and Wi-Fi capabilities

Contractual: The software is purchased through a license agreement with Central Valley Software Solutions, LLC. The licenses for the Ditchrider Interface and Customer Portal give full access and ownership of the software to the District. The renovation of the company website in preparation for the customer portal will be performed, through contractual agreement, by True Compass Designs; the renovation is a one-time cost. Steven Floyd Consulting has provided valuable and economic computer support to the District for years and is the most knowledgeable consultant to transition our servers over and act as the on-site computer support. The Ditchrider Interface iPads will be purchased through Verizon in conjunction with the cellular and internet plan; Verizon provides the District with governmental discounts unmatched by other providers. All contracted work with finite cost and objectives were included in the budget breakdown for this grant.

In addition to the complete purchase of the software, the district must also enter into a support agreement with Central Valley Software Solutions, LLC for both the Customer Portal and Ditchrider Interface. This support will ensure any technological problems seen in the software are resolved immediately; the District has had a successful history with Central Valley Software Solutions and can trust that any problems faced by the District will receive attention within 24 hrs. A continual support agreement with Stephen Floyd Consulting will ensure internal computers and server are properly installed and remains online. The continued contract with Anderson Perry and Associates will continue GIS support and updates for all water records and geospatial data necessary for the software. A two-year contract with Verizon Wireless must be signed in order to provide cellular and internet connection to in-the-field iPads for real-time data connection. All contractual agreements defined as continual monthly/yearly costs are added to the NUID yearly budget but were not considered in the grant/project budget as they were viewed as *annual subscription expenses*.

Environmental and Regulatory Compliance Costs: There are no costs in the budget for environmental and regulatory compliance costs.

Reporting: District staff will be responsible for the reports on the status of the project as per the grant guidelines. The hours spent on reporting are included in the in-kind hours reported in the budget. The office manager will prepare the financial reports and the manager and assistant manager will provide the progress reports.

Other Expenses: None

Indirect Costs: None

Total Costs: \$69,841.61

4. Detailed Project Budget

Please refer to Table 2, which provides the detailed breakdown of all costs encountered during the project. Note the contracts are broken down into the tasks being performed by the contracted agency. (See Exhibit A)

5. Official Resolution

The North Unit Irrigation District approved this project in November 2018, attached is the resolution that was adopted. (See Exhibit B)

6. Environmental Compliance

The project does not require any environmental compliance.

EXHIBIT A

Table 3. Detailed Budget by Line Item

	RATE	NUMBER	UNITS	TOTAL COST
PERSONNEL COST				
Mike Britton, General Manager	\$ 46.11	20	hours	\$ 922.20
Gary Calhoun, Operations Manager	\$ 30.20	25	hours	\$ 755.00
Watermaster/Construction Manager	\$ 28.85	46	hours	\$ 1,327.10
Marlene Lloyd, Office Manager	\$ 28.85	40	hours	\$ 1,154.00
Lisa Windom, Special Projects and Water Operations Coordinator	\$ 21.00	125	hours	\$ 2,625.00
Sue Light, Water Records Clerk	\$ 21.44	26	hours	\$ 557.44
Ditchriders/Substitutes	\$ 22.36	150	hours	\$ 3,354.00
SUBTOTAL				\$ 10,694.74
FRINGE BENEFITS				
Mike Britton, General Manager	\$ 16.59	20	hours	\$ 331.80
Gary Calhoun, Operations Manager	\$ 13.77	25	hours	\$ 344.25
Watermaster/Construction Manager	\$ 13.53	46	hours	\$ 622.38
Marlene Lloyd, Office Manager	\$ 12.34	40	hours	\$ 493.60
Lisa Windom, Special Projects and Water Operations Coordinator	\$ 12.14	125	hours	\$ 1,517.50
Sue Light, Water Records Clerk	\$ 11.34	26	hours	\$ 294.84
Ditchriders/Substitutes	\$ 12.39	150	hours	\$ 1,858.50
SUBTOTAL				\$ 5,462.87
TRAVEL				
SUBTOTAL				\$ -
EQUIPMENT				
SUBTOTAL				\$ -
SUPPLIES AND MATERIALS				
<i>Central Valley Software Solutions, LLC</i>				
Customer Portal User Liscence	\$ 5,000.00	1	each	\$ 5,000.00
Ditchrider iOS interface User Liscence	\$ 1,000.00	11	each	\$ 11,000.00
<i>Verizon Wireless Electronic Devices</i>				
iPads	\$ 500.00	12	each	\$ 6,000.00
<i>Steven Floyd Consulting Computers</i>				
Poweredge T330 with Windows Server 2012 r2	\$ 3,820.00	1	each	\$ 3,820.00
Precision Tower 3000 Series (3620) computers	\$ 1,558.00	8	each	\$ 12,464.00
Ubiquiti Wifi adaptor	\$ 300.00	1	each	\$ 300.00
Microsoft SQL Server 2016 Software Bundle, OEM (5 CAL)	\$ 1,980.00	1	each	\$ 1,980.00

EXHIBIT A

Microsoft SQL Server 2016 Standard Bundle, (5 more CAL)	\$ 1,010.00	1	each	\$ 1,010.00
Sonicwall TZ300 Router + 3 yr total secure	\$ 1,000.00	1	each	\$ 1,000.00
Replacement drives on current server to run Linux for ditchrider hub (300 GB)	\$ 250.00	2	each	\$ 500.00
SUBTOTAL				\$ 43,074.00
CONTRACTS				
<i>Steven Floyd Consulting Labor</i>				
Initial server setup	\$ 750.00	1	each	\$ 750.00
Onsite migration between servers	\$ 2,000.00	1	each	\$ 2,000.00
8 Set-up per computer (\$500/computer)	\$ 500.00	8	each	\$ 4,000.00
<i>True Compass Designs Website Update</i>				
Website design and development	\$ 2,300.00	1	each	\$ 2,300.00
Management of Data (Prep for upload)	\$ 1,100.00	1	each	\$ 1,100.00
Level 1 Search Engine Optimization)	\$ 320.00	1	each	\$ 320.00
Setup of Security (WP Security/Word Fence)	\$ 140.00	1	each	\$ 140.00
SUBTOTAL				\$ 10,610.00
OTHER				\$ -
TOTAL DIRECT CHARGES				\$ 53,684.00
INDIRECT/INKIND CHARGES				\$ 16,157.61
TOTALS				\$ 69,841.61

**NORTH UNIT IRRIGATION DISTRICT
RESOLUTION NO. 2018-8**

ELECTRONIC WATER ORDER SOFTWARE IMPLEMENTATION

WHEREAS: The proposed project will involve the installation of electronic water order software designed as a constant review process to monitor and project district water usage in real-time. The project will be a cooperative effort between the North Unit Irrigation District, Central Valley Software Solutions, LLC, Anderson Perry and Associates, Inc, True Compass Design, LLC, and Stephen Floyd Consulting, Inc. The project will provide online water order for our water users, real-time water usage data for water users, additional real-time water management information to make system improvements; and,

WHEREAS: The irrigation district will realize water savings and the landowners a savings by providing tools to sustainably manage their water in real-time.


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

1. Michael Britton is the district official with the legal authority to enter into an agreement for financial assistance under the WaterSMART Grant;
2. The Board or governing body has reviewed and supports the proposal submitted;
3. The applicant is capable of providing the amount of funding and/or in-kind contributions, specified in the funding plan; and
4. If selected for a WaterSMART Grant, the applicant will work with the Bureau of Reclamation to meet established deadlines for entering into a cooperative agreement.

DATED: December 11, 2018


Martin Richards
Chairman

ATTEST:



Michael Britton
Secretary – District Manager