WaterSMART Grants: Water and Energy Efficiency Grants for Fiscal Year 2019

Bureau of Reclamation- FOA No. BOR-DO-19-F004

Henefer Town

Canal Lining, Secondary Irrigation Piping, and Small Hydro Project

March 19, 2019

Applicant:

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Project Manager:

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Table of Contents

Attachments

Technical Proposal and Evaluation Criteria

Executive Summary

Applicant Info

Date: March 19, 2019
Applicant Name: Henefer Town
City, County, State: Henefer, Summit County, Utah
Project Manager:

Brian Deeter
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Project Funding Request: Funding Group II $1,500,000 Total Project Cost $3,250,000

Project Summary

Specify the work proposed, including how funds will be used to accomplish specific project activities and briefly identifies how the proposed project contributes to accomplishing the goals of this FOA.

The proposed Henefer Town Canal Lining, Secondary Irrigation Piping, and Small Hydro Project will line two large sections of the Henefer Irrigation Canal – the main ditch, approximately 4,000 feet, and the Big Ditch, 3,600 feet. The project will also provide Henefer Town with a piped pressurized and metered secondary water system to supply water to the residential and larger rural lots who flood irrigate or use culinary water. A new flume will be constructed along with an underwater micro-hydro turbine station that will produce 514 kWh of energy per year to run the SCADA system. The lining of the canals and the new secondary system contribute to the goals of the FOA in the following ways:

- Conserves 1,034 acre-feet of water
- Reduces conflicts due to flooding from the unlined canals
- Increases water reliability within the Town's culinary system and reduces the need for costly culinary water infrastructure investments
- Allows for better water management by metering both the irrigation and the secondary water
- Sprinkler irrigation opportunities will be supported with the lining of the canals as it allows for a more dependable water delivery system

Length of Time and Estimated Completion Date

State the length of time and estimated completion date for the proposed project.

Henefer Town (Town) will start the preliminary design in July 2019 and will be ready to move forward with the environmental report as soon as the award is announced in September 2019. The project will stay within the existing ditch alignment and Town street rights-of-way for the secondary system. It is anticipated that the construction of the secondary piping portion of the project will start August/September 2021, and the lining of the canal will start as soon as the water is out of the canal in Fall 2021. The project will be accomplished within the three-year allowance – October 2019 - September 2022.

Federal Facility

Whether or not the project is located on a Federal facility.

The project is not directly located on a federal facility; however, Henefer Town and Henefer Irrigation Company are in the same basin as Echo Reservoir and Weber Basin Water Conservancy District. The water saved by Henefer Town, Henefer Irrigation, and Big Ditch will contribute to Echo Reservoir, Weber River, and Weber Basin Water facilities.

Background Data

Henefer Town and Henefer Irrigation applied for and were awarded a Water Conservation Field Service System Optimization Review (SOR) Planning Grant to evaluate their two systems. They used the SOR to understand better the best way to work together to solve some major water issues happening within both of their water systems. This planning process is helping them understand how to come together to conserve valuable culinary and irrigation water, how to serve agricultural and residential users as the Town grows, and how to apply resiliency strategies. The resiliency strategies include modeling for alternative infrastructure opportunities, evaluating rate structures, water conservation through metering, infrastructure development, and messaging and education about drought and over-watering use.

The main reason they began the planning process was that they were having so many issues with both the irrigation water and culinary water in and around the Town. They found they were dependent upon each other and that they would never solve their problems if they did not work together. The following are the main issues they are facing:

- **Significant water losses within the irrigation system in and around the Town**
  Henefer Irrigation Company is the main irrigation company that delivers water to most of the residents who have water shares and use it to water larger residential lots and pastureland on larger acre lots in Henefer. Henefer Irrigation Company also provides irrigation water to agricultural land that surrounds the Town of Henefer. The Town owns hundreds of water shares in this irrigation company. The Henefer Irrigation Company's distribution system is made up of old, broken up lined and unlined canal that contentiously floods residents and farmlands along the canal. Substantial seepage losses in the open ditches throughout the Town have always been an issue. Due to the water seeping from the canal, the Town installed a drainage system to protect their sewer system against infiltration. During drought years, Henefer Irrigation Company has had many problems trying to deliver enough water to its users due to the losses in the canal. Their water comes from a diversion in the Weber

Photo 1 Main Canal that leaks and floods that will be lined

River, and water turns have been cut short for the past seven years; thus, the Town's residents turn to culinary water to water their grass, gardens, and sometimes even their pastures. Therefore, Henefer Town has seen a significant impact on its culinary water system.

- **Impacts on the Culinary Water Supply System**
  The culinary water comes from a natural spring high up in the Wasatch Mountains above the Town. This water is clear, clean spring water that tastes like a pure mountain spring; the type those in California want to bottle and sell. Henefer and many of its residents have irrigation water shares, but they are not using them to water their residential yards and gardens. Instead, they hook their sprinklers up to the culinary water service for convenience, reliability, and to have a pressurized system. The Town's culinary water system cannot sustain this type of use, which has put a strain on the Town's two springs – their only culinary water sources – especially during the hottest part of the summer when the spring's flows are at its lowest. Now – June through September – Henefer must put outdoor watering restrictions on the Town residents because the culinary water tanks and spring collection systems cannot keep up with the high demands. During the summer, the outdoor water demands put the Town's fire suppression and culinary water in jeopardy. Based on all the studies that have been completed, the Town cannot drill any new wells for culinary water, so their only option for a new culinary water source would be to treat water out of the Weber River, which is costly. The Town has raised its culinary water rates two times in the past two years, hoping that people would conserve water if they had to pay more; but so far it has no real impact on the Town's biggest users. Therefore, the Town once again raised its culinary water rates, and now those who choose to use large amounts of culinary water could see water bills over $500.00.

Photo 2 Open Middle Town Ditch

- **Impacts from Growth**
  Henefer Town is a small rural town in Summit County, located in the Wasatch Mountains about thirty minutes by car from Ogden, Utah, and about twenty minutes by car to Park City, Utah. Primarily agricultural farmland, growth, and development have started to change the nature of Henefer Town's land uses. In 2017, the population was estimated to be 871, with about 300 residential units. This was a significant population change for this little town, according to the 2010 Census, which estimated that Henefer had a population of 684, with 219 housing units. In the spring of 2018, the Town put a moratorium on allowing any new connections to the Town's culinary water system. Within just a few weeks of passing the moratorium, the Town had over eight subdivision proposals

submitted for consideration, which means multiple new residential homes will want to use culinary water for outdoor use. The Town also had three annexation requests that would bring 150 acres of land into the Town for development. It is estimated that this would almost double the population of Henefer in ten years if all these proposed subdivisions and annexation requests were to be approved within the next few years.

Utah was the eighth fastest growing economy in the nation in 2018. In addition to strong GDP growth, there are other strong signs for Utah's economy. The state's population is growing at one of the fastest rates in the nation (1.9% in 2016 alone), and its employment growth rate is even better (3.1%). Summit County, where Henefer is located, is seeing the impacts of this growth; the reason – its accessibility to industrial and employment centers. You can live in a beautiful mountainous rural area and be at the office in less than a thirty or forty-minute drive to Ogden or Salt Lake City.

Photo 3 Henefer small town with lots of new growth

- **Drought**

  Last year, the drought hit Henefer hard. The Town, along with Henefer Irrigation Company, had to cut water use earlier than ever before. The Town had to start limiting culinary water use on lawns and gardens as soon as April, and Henefer Irrigation cut shares by half early in the season and ended the season in August – four weeks earlier than usual.

  Since 1895, when official weather records have been kept, "Utah has never experienced a year with as little precipitation as it did in 2018 and only one previous year registered higher average temperatures," according to the National Oceanic and Atmospheric Administration (NOAA).

  The Utah Department of Natural Resources stated that "for the water year that ended Sept. 30, Utah led the nation in terms of its relative dryness over the past 123 years. The impact can be seen in plunging levels of Utah reservoirs, disappearing streams, and toxic algal blooms. Echo Reservoir water levels were at 21% on September 9, 2018, and the Rockport Reservoir was at 37%." These are the main reservoirs for storage in the Weber River Basin. This put many water users in the Weber River Basin out of water in August. Sixteen of the 49 significant reservoirs tracked by the Utah Department of Natural Resources are below 20 percent, and eight of those are below 5 percent. At the end of the 2018 summer, Utah used the majority of the storage in all its reservoirs. Going into 2019 with low reservoirs and very hot, dry conditions at the start of fall is a big concern for all water users in Utah.

Water Supply

Source of water supply and water rights involved.

The Henefer Irrigation Company diverts water out of the Weber River about 2 ½ miles East of the Town of Henefer midway between Henefer and Echo Dam. Henefer Irrigation has 975 shares and irrigates 1,157.5 acres of land. The average annual diversion for Henefer Irrigation from state records is 4,702 acre-feet. Henefer Irrigation also owns shares of stock in the Weber River Water User's Association, which has storage in Echo Reservoir. Their ditch system consists of the main ditch, the Big Ditch, the Middle Town Ditch, and the Back Town Ditch. The main ditch runs about 4,500 feet from the point where it is diverted out of the Weber River to a constant head orifice (CHO) structure where the water is measured. Below the CHO, the ditch delivers water to fields east of Henefer. On the South side of Henefer Town, the main ditch splits into the Big Ditch, and the Middle and Back Town ditches. The main ditch and the Big Ditch are open and unlined earthen ditches. The Middle and Back Town ditches are a combination of piped and open ditch sections throughout the Town of Henefer. The Big Ditch takes approximately 76% of the flow of the main ditch. The Big Ditch, Middle Town Ditch, and Back Town Ditch all deliver water to fields on the North side of Henefer Town.

Henefer Irrigation takes its water rights from the Weber River, and they include per decree:

- 25.72 cfs Flood
- 21.04 cfs High
- 11.58 cfs Low flow

Henefer Town owns 35 shares in Henefer Irrigation. Each share represents 3 acre-feet. As new properties are developed, they are required to turn over Henefer Irrigation shares to Henefer Town.

Current water uses, and number of water users served, primarily used for irrigation, describe major crops and total acres served.

Henefer Irrigation water supply is primarily used for irrigation, with a limited amount for urban use due to users choosing to use culinary water to water grass and gardens because of convenience. Henefer Irrigation has 35 shareholders, 975 shares with each share allowing for three acre-feet of water and irrigates 1,157.5 acres. The major crops are alfalfa and grass hay. Some of the irrigated lands are used for pasture and livestock.

Current and projected water demand/potential shortfalls in water supply.

Current demands are for more than 4,702 acre-feet of water. Projected water demands include agricultural use and to supply water for lawns and gardens to the residents in Henefer Town where the Secondary Water System will be constructed. The new secondary water system will serve over 330 connections, and additional growth as the community continues to change from agricultural use to residential use.

- **Drought**
  Last year, the drought hit Henefer hard. The Town, along with Henefer Irrigation Company, had to cut water use earlier than ever before. The Town had to start limiting culinary water use on lawns and gardens as soon as April, and Henefer Irrigation cut shares by half and ended the season in August – four weeks early than usual. This has been a pattern over the past seven years, but 2018 was even more intense than before due to higher than average temperatures and very little precipitation, and a winter that left us wanting for water to refill the reservoirs.

- **Significant water losses within the irrigation system in and around the Town.** Henefer Irrigation Company is the main irrigation company that delivers water to most of the residents who have water shares and use them to water larger residential lots and pastureland on larger acre lots in Henefer. They also provide irrigation water to agricultural land that surrounds the Town of Henefer. The Town owns shares representing nearly 100 acre-feet of water in this irrigation company. Henefer Irrigation distribution system is made up of unlined canals and ditches that regularly flood residents and farmlands along the canal. Substantial seepage losses in the open ditches within the Town have always been an issue. The Town installed a drainage system to protect their sewer system against infiltration due to the water seeping from the ditches. During drought years, Henefer Irrigation has had many problems trying to deliver enough water to its users due to the losses in the ditches. Their water comes from a diversion in the Weber River, and water turns have been cut short for the past seven years.

Water Delivery System

The larger ditch system consists of the main ditch, the Big Ditch, the Middle Town Ditch, and the Back Town Ditch. The main ditch runs about 4,500 feet from the point where it is diverted out of the Weber River to a constant head orifice (CHO) structure where the water is measured. Below the CHO, the ditch delivers water to fields east of Henefer. The main ditch continues to the south side of Henefer Town where it splits into the Big Ditch and the Middle and Back Town ditches. The main ditch and the Big Ditch are open and unlined earthen ditches. The Big Ditch takes approximately 76% of the flow of the main ditch. The Big Ditch, Middle Town Ditch, and Back Town Ditch all deliver water to fields on the North side of Henefer Town. Currently, the Middle and Back Town ditches that run throughout town are a combination of piped and open ditch sections that run within the street rights-of-way, giving large residential properties access to this irrigation water.

Photo 4 Main Ditch Unlined

Hydropower/Energy Efficiency

If the application includes hydropower or energy efficiency elements, describe existing energy sources and current energy uses.

The project will increase the production of hydropower by constructing an underwater micro-hydro turbine station that will produce 514 kWh of energy per year. The power will be used for SCADA at the flume on the canal to meet the power needs of the system at that remote location.

Relationship with Reclamation

Identify any past working relationships with Reclamation. This should include the date(s), a description of prior relationships with Reclamation, and a description of the project(s).

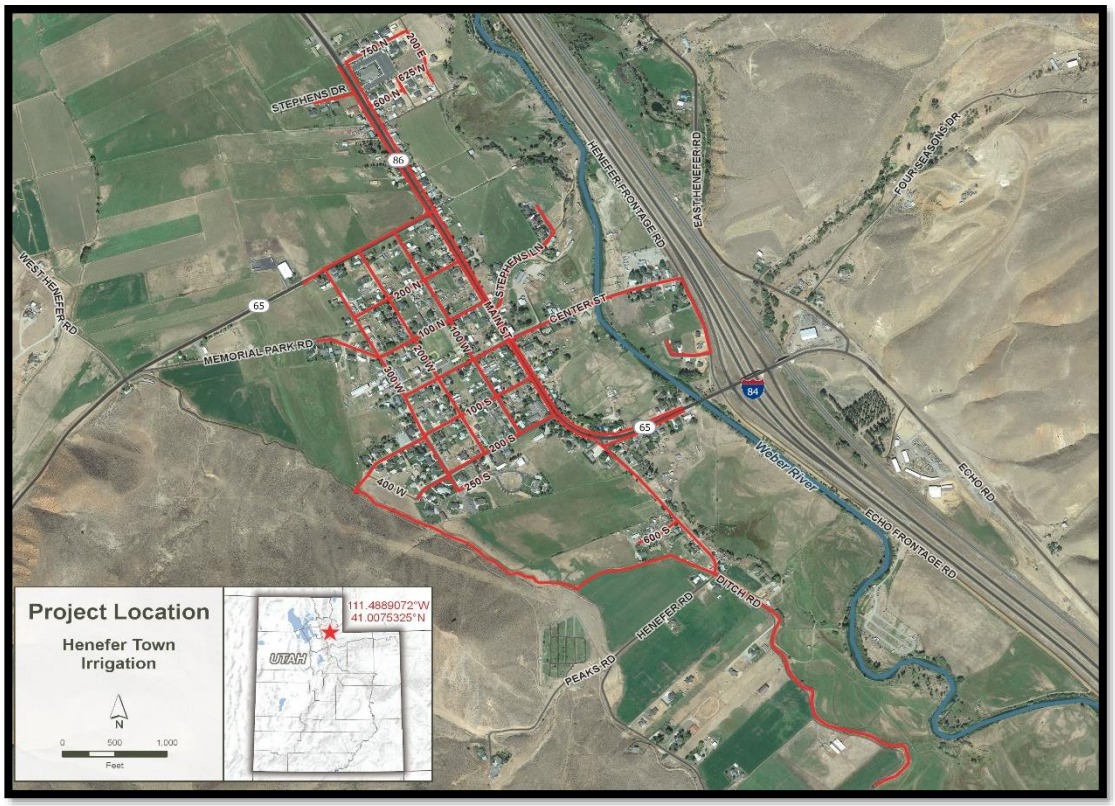
Henefer Town and Henefer Irrigation have participated with the Weber Basin Water Conservancy District in the development of the District's most recent Drought Plan, and over the years, they have worked on small projects in the Weber River. Henefer Town received a Water Conservation Field Service Planning Grant in 2018 to work with Henefer Irrigation Company to prepare a System Optimization Review Plan.

Project Location

Geographic Location

Henefer Town is in the Wasatch Mountains about thirty minutes by car from Ogden, Utah, and about twenty minutes by car to Park City, Utah. The Weber River and Highway run through the east part of the Town. The Town is half a mile north of Echo Reservoir. See Attachment A Henefer Project Location Map for a larger view and Attachment B Project Detail Map.

Figure 1 Project Location Map



Technical Project Description

Describe the work in detail, including specific activities that will be accomplished. This description shall have sufficient detail to permit a comprehensive evaluation of the proposal.

The proposed project will line two large sections of the Henefer Irrigation Canal and pipe and meter 330 residential secondary water connections. 4,000 feet of the main ditch and 3,600 feet of the Big Ditch will be lined with geotextile and an Ethylene Propylene Diene Monomer (EPDM) liner. The EPDM liner is essentially a rubber liner which is UV resistant and has seamed joints for a 100% watertight seal between the water and the soils. The liner will be protected from

livestock by fencing. The secondary water system will be constructed using the following materials:

- 6" – 10" C-900 PVC Pipe
- Magnetic Residential Water Meters for secondary water
- EPDM liner will also be used to line the secondary water pond
- Typical fittings and other appurtenances

A new flume will be constructed along with an underwater micro-hydro turbine station that will produce 514 kWh of energy per year to run the SCADA system.

E.1. Technical Proposal: Evaluation Criteria

E.1.1. Evaluation Criterion A – Quantifiable Water Savings (30 Points)

Quantifiable Water Savings

Describe the amount of estimated water savings.

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

The total estimated amount of water expected to be conserved as a direct result of this project is 1,034 acre-feet per year. The estimated amount of water now lost to seepage, expected to be conserved by lining 7,600 feet of the open ditch, are 918 acre-feet. The volume of culinary water that will no longer be used for irrigation, but will be made available for indoor use, is 116 acre-feet.

Describe current losses.

Explain where the water that will be conserved is currently going (e.g., back to the stream, spilled at the end of the ditch, seeping into the ground).

Water losses in the ditch are currently lost to deep percolation as water seeps from the bottom. Much of this water will eventually make its way back to the Weber River.

Describe the support/documentation of estimated water savings.

Provide sufficient detail supporting how the estimate was determined, including all supporting calculations.

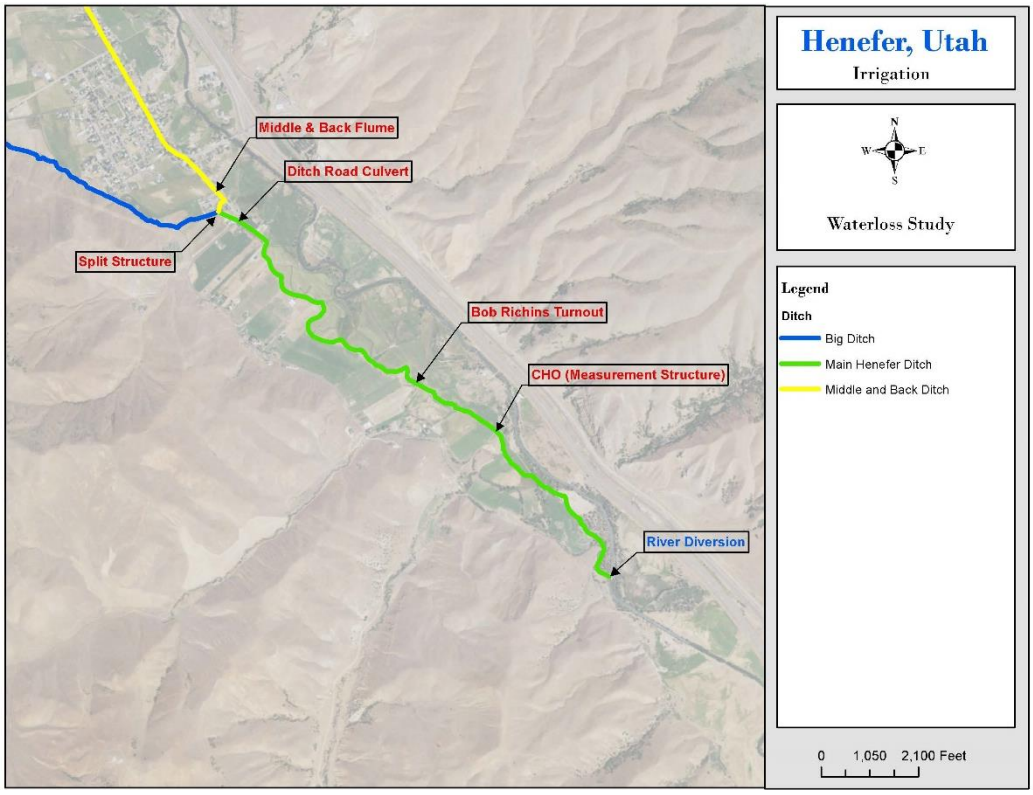
The project includes the lining of two sections of open and currently unlined ditches. The first section is approximately 4,000 feet (0.76 miles) of the main Henefer Irrigation Ditch. The second section is approximately 3,600 feet (0.98 miles) of the Big Ditch. The part of the Big Ditch to be lined is from the location of its split from the main Henefer Irrigation Ditch to the site of the secondary irrigation reservoir. The Big Ditch will also be enlarged to accommodate additional flow needed for the secondary irrigation project.

Water savings are calculated based on a water loss study performed by J-U-B Engineers, Inc. on August 13, 2018. The section studied was on the main Henefer Irrigation Ditch from the Constant Head Orifice (CHO) structure to the split where the main ditch splits into the Big Ditch and Middle and Back Ditches. Below Table 1 summarizes the water loss study and Figure 2 Water Loss Study Map depicts flow measurement locations for the water loss study.

Table 1 Water Loss Study Summary

Location	Description	Flow (cfs)	Outflow (cfs)	Loss (cfs)	Loss (%)	Distance (ft)	Distance (mi)	Loss (cfs/mi)
CHO	Measurement Structure	34.5						
Bob Richins	Head Gate		5.2					
Ditch Road	Culvert	20.7		8.6	24.9%	8,606	1.63	5.3
Big Ditch	Concrete Structure	4.8						
Middle & Back	Parshall Flume	15.3						
Sum West & MB		20.1		0.6	2.9%	500	0.09	6.3
TOTAL LOSS				9.2				

Figure 2 Water Loss Study Locations



Flows were measured using either an existing flow measurement structure (CHO and Parshall Flume) or using a velocity probe to measure water velocities within a control section with known dimensions and calculating a flow rate.

Annual water loss for the main Henefer Irrigation Ditch was calculated by applying the loss rate (as determined in Table 1 above) to the average annual diversion rate for the main ditch as published by the State of Utah.

Main Henefer Irrigation Ditch - CHO to Split		
Length	1.63	Miles
Mean Diversion (From State)	4702	AF
Measured (8/13/18)	24.9%	Total lost flow
Calc. Annual Loss	1172	AF
Calc. Loss/Mile	**719**	**AF**

NRCS Soil Surveys indicate that the Big Ditch and the main Henefer Irrigation Ditch are in similar soils with similar transmissivity rates. The ditches are observed to be in the same condition, so the assumption is that the water losses within the Big Ditch will be like those in the main ditch. The Big Ditch takes approximately 76% of the flow of the main ditch after the split, so water loss in terms of acre-feet per mile of the ditch was assumed to be proportional to the flow rates.

Big Ditch - After Split		
Measured % split	76%	
Calc. Loss/Mile (76% Main)	**546**	**AF**

The seepage loss calculations for the sections to be lined are readily determined once the annual volume loss per mile of the ditch is determined.

Line Main Ditch		
Length	4000	ft
Length	0.76	mile
Calculated Loss	*546*	*AF*
Line Big Ditch		
Length	3600	ft
Length	0.68	mile
Calculated Loss	*372*	*AF*
Total Loss	**918**	**AF**

Seepage losses are assumed to be 100% eliminated with an impervious canal liner, so total water savings from the ditch lining is 918 AF.

Canal Lining/Piping

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

It is assumed that 100% of the water currently being lost to seepage will be eliminated by lining the canal. The result is 918 acre-feet of water saved annually.

The previous section describes how water loss in each of the two sections of the ditch was estimated.

CHO to Split Section – These water losses were measured in the field on August 13, 2018. The full section of the main ditch from the main measurement structure to the split was measured. The measured loss in that section was 24.9%. The annual average diversion rate from the state as measured at the CHO is 4,702 acre-feet. The average annual loss for this section was calculated as follows:

$$24.9\% \; x \; 4{,}702 \; acre \; feet = 1{,}172 \; acre \; feet$$

The average loss per mile for this section was calculated as follows:

$$1{,}172 \; \div 1.63 \; miles = 719 \; acre \; feet \; per \; mile$$

The total seepage loss to be eliminated by lining 0.76 miles of this section was calculated as follows:

$$0.76 \; miles \; x \; 719 \; acre \; feet \; per \; mile = \mathbf{546 \; acre \; feet}$$

Big Ditch below the Split – Water flow into the Big Ditch was measured on the day of the water loss study; however, the losses in the Big Ditch weren't measured but were assumed to be comparable to the main ditch. The Big Ditch takes 76% of the main ditch flow, so the losses were assumed to be proportional:

$$76\% \; x \; 719 \; acre \; feet \; per \; mile = 546 \; acre \; feet \; per \; mile$$

The total seepage loss to be eliminated by lining 0.68 miles of this section was calculated as follows:

$$0.68 \; miles \; x \; 546 \; acre \; feet \; per \; mile = \mathbf{372 \; acre \; feet}$$

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

The state records dating back to 1948 were relied upon for determining the average annual diversion volume for the Henefer Irrigation Company. The water loss study was done later in the season when the soils would be fully saturated and would represent a conservative measure of water loss to seepage. The losses measured on August 13, 2018, were assumed to be representative of the entire season in terms of total ditch volume lost.

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

The ditches will be lined with an impervious membrane, which is expected to eliminate 100% of the seepage losses.

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

Annual transit losses are 638 acre-feet per mile (918 acre-feet/1.44 miles).

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

As part of this project, a new measuring flume will be installed on the Big Ditch right after the split. Measurements at the new flume, in conjunction with measurements at the existing CHO, will provide data for the entire season, which will indicate post-project seepage losses.

In addition, a water loss study will be performed specifically on the lined sections using an acoustic Doppler current profiler that is now available to the Town of Henefer to use.

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

The canal lining portion of this project will be accomplished with geotextile and an Ethylene Propylene Diene Monomer (EPDM) liner. The EPDM liner is essentially a rubber liner which is UV resistant and has seamed joints for a 100% watertight seal between the water and the soils. The liner will be protected from livestock by fencing.

The secondary water system will be constructed using the following materials:

- 6" – 10" C-900 PVC Pipe
- Magnetic Residential Water Meters for secondary water
- EPDM liner will also be used to line the secondary water pond
- Typical fittings and other appurtenances

E.1.2. Evaluation Criterion B – Water Supply Reliability (18 Points)

Address how the project will increase water supply reliability. Provide sufficient explanation of the project benefits and their significance. These benefits may include, but are not limited to, the following:

1. Will the project address a specific water reliability concern? Please address the following:

- *Explain and provide detail of the specific issue(s) in the area that is impacting water reliability, such as shortages due to drought, increased demand, or reduced deliveries. Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?*

As stated previously, there are significant water losses within the irrigation system in and around the Town. The Henefer Irrigation Company's distribution system is made up of old, broken up lined and unlined canal that contentiously floods residents and farmlands along the canal. Substantial seepage losses in the open ditches throughout the Town have always been an issue. Due to the water seeping from the canal, the Town installed a drainage system to protect their sewer system against infiltration. During drought years, the Irrigation Company has had many problems trying to deliver enough water to its users due to the losses in the canal. Their water comes from a diversion in the Weber River, and water turns have been cut short for the past seven years; thus, the Town's residents turn to culinary water to water their grass, gardens, and sometimes even their pastures. Therefore, Henefer Town has seen a significant impact on its culinary water system.

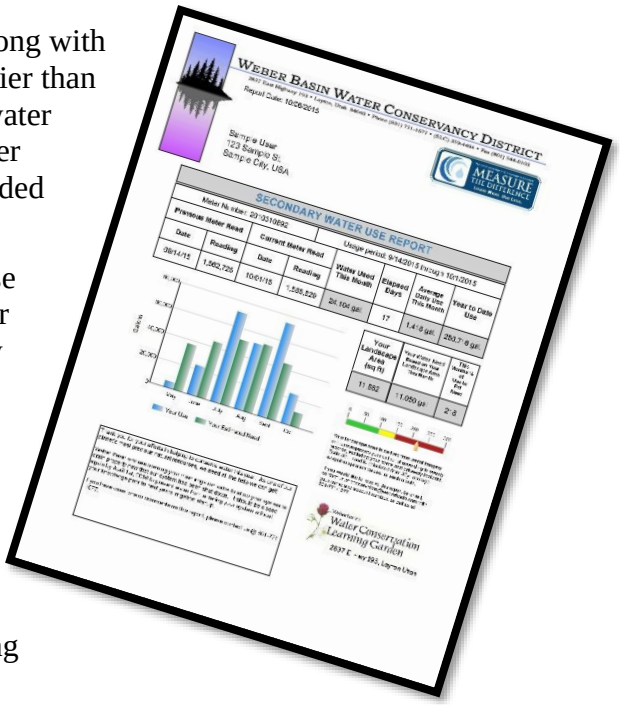
Photo 5 Open Middle Town Ditch

The culinary water comes from a natural spring. Many of its residents have irrigation water shares, but they are not using them to water their residential yards and gardens. Instead, they hook their sprinklers up to the culinary water service for convenience,

reliability, and to have a pressurized system. The Town's culinary water system cannot sustain this type of use, which has put a strain on the Town's two springs –their only culinary water sources – especially during the hottest part of the summer when the spring's flows are at its lowest. Now – June through September – Henefer must put outdoor watering restrictions on the Town residents because the culinary water tanks and spring collection systems cannot keep up with the high demands. During the summer, the outdoor water demands put the Town's fire suppression and culinary water in jeopardy. Based on all the studies that have been completed, the Town cannot drill any new wells for culinary water, so their only option for a new culinary water source would be to treat water out of the Weber River, which is costly.

Impacts from growth is another issue detailed above. Primarily agricultural farmland, growth, and development have started to change the nature of Henefer Town's land uses. In the spring of 2018, the Town put a moratorium on allowing any new connections to the Town's culinary water system. Within just a few weeks of passing the moratorium, the Town had over eight subdivision proposals submitted for consideration, which means multiple new residential homes will want to use culinary water for outdoor use. The Town also had three annexation requests that would bring 150 acres of land into the Town for development. It is estimated that this would almost double the population of Henefer in ten years if all these proposed subdivisions and annexation requests were to be approved within the next few years.

Last year, the drought hit Henefer hard. The Town, along with Henefer Irrigation Company, had to cut water use earlier than ever before. The Town had to start limiting culinary water use on lawns and gardens as soon as April, and Henefer Irrigation cut shares by half early in the season and ended the season in August – four weeks earlier than usual.



This project will help address water reliability for these issues – water losses, use of culinary water for outdoor watering, and having water for growth. The secondary system meters that will be placed on every connection will help during drought situations so that users can understand conservation and their uses. Henefer will pattern their education, notification, and ultimately billing information after Weber Basin Water Conservancy District's information. This has proven to educate users on how much water is needed for outdoor use. See Attachment F Weber Basin Billing Statement.

- *Describe how the project will address the water reliability concern? In your response, address where the conserved water will go and how it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.*

  In the past, additional water was diverted just to get the flows to the users because of the large losses in the system. This will no longer be required. The irrigators will only need to take what is needed. Water saved in the irrigation system will be used as was intended,

and for secondary use, allow irrigators to have their full water right. Water saved in the culinary system will be used in the culinary system for security in having the proper emergency water storage and fire suppression storage that is required during the summer months, and for growth.

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

  The water conserved through the elimination of seepage, spillage, and evaporation will be delivered to the irrigated land through the new piped, pressurized system. In other words, the same mechanism that conserves the water will also deliver the conserved water to the crops.

  The water conserved through increased irrigation application efficiencies will be delivered to the crops through the same piped system and applied to the crops through the new on-farm sprinkler systems. Again, the same mechanism that provides the means for conservation by increasing application efficiency will deliver the conserved water to its ultimate destination and be used for irrigating crops.

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

  The conserved water will be used for irrigating the farmland within the service area, providing secondary water for residential use, and culinary water savings will be used for indoor use; all of which are for the intended purpose.

2. *Will the project make water available to achieve multiple benefits or to benefit multiple water users? Consider the following:*

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

     Yes, it will benefit the agriculture users, residential users, habitats within the Weber River and users downstream who will be able to have access to water that is now staying in the Weber River.

     - *Will the project benefit species (e.g., federally threatened or endangered, a federally recognized candidate species, a state listed species, or a species of particular recreational, or economic importance)? Describe the relationship of the species to the water supply, and whether the species is adversely affected by a Reclamation project.*

       The project does not have any anticipated adverse effects on any threatened and endangered species, state sensitive species, wetlands, and other jurisdictional waterways. From past environmental reviews done in the area, we are aware of the Yellow-billed cuckoo and Canada lynx. Both species require dense vegetation and undisturbed habitat. The proposed project actions are unlikely to take place in and disturb habitat for either species. Several migratory birds exist in the general vicinity and nests may be located in or adjacent to project disturbance areas. Mitigation measures, such as timing vegetation clearing to take place outside of the migratory birds' nesting season and preconstruction nest surveys, will be conducted to minimize any potential impacts to nesting birds.

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

       Yes. There are two water reliability issues that this project addresses: 1 – large water losses in the canals and drought reducing water shares, and 2 – culinary water used for outdoor watering. As described earlier, the water reliability of

Henefer Town's culinary water system is intensely burdened by residential users. Eventhough these users have irrigation shares they choose to use culinary water for lawns and gardens because it is more convenient. According to the SOR Plan during May through September, the culinary spring flow production is just meeting the system demands, and it should **not be** assumed that there is any excess capacity to meet any increased demand or fire suppression. "**The existing water sources should be considered at capacity if not deficient**." The development of the secondary system is a necessity to reduce the demands on the culinary system. During the peak demand months of the year, **over half of the demand on the system comes from irrigation requirements for lawns and gardens.** Henefer Town owns over 35 shares in the Henefer Irrigation Company, which at three acre-feet per share, represents more than adequate water to meet the demands of a secondary water system for the existing population. The creation of a secondary water system would delay the requirement to develop any additional drinking water sources for Henefer until after 2040.

- *Will the project benefit Indian tribes?*

  No, the project will not directly benefit any tribes; however, all water conservation in the Weber River Basin will have some sort of benefit, primarily throughout the drought years.

- *Will the project benefit rural or economically disadvantaged communities?*

  Yes, Henefer Town is an economically disadvantaged community. This project will reduce the use of culinary water on lawns and gardens and help the Town conserve the important culinary water for indoor use. Without this project, the Town would need to look for additional culinary water sources. The most likely being that of shallow groundwater associated with the Weber River. Treatment of raw water directly from the river is also an option. Coalville City is located just 10 miles upriver from Henefer and has undertaken such a project; however, the Coalville plant has a capacity of only 200 gpm, which is half of the required flow to see Henefer through 2040. The cost to construct the 200 gpm treatment plant is $3,300,000 with an estimated annual treatment cost of $42,000; a very costly source of water, but because the area has sandstone formations that are not prolific with groundwater, the water quantity would be limited and the water quality likely inferior. If they attempted to drill a well with the expectation of the required production, they would need at least 400 gpm. This could be risky and expensive without satisfactory results.

  - *Describe how the project will help to achieve these multiple benefits. In your response, please address where the conserved water will go where it will be used, including whether the conserved water will be used to offset groundwater pumping, used to reduce diversions, used to address shortages that impact diversions or reduce deliveries, made available for transfer, left in the river system, or used to meet another intended use.*

    The water will be left in the river, for the most part, in that the Henefer Irrigation will not need to over-divert water just to try and get it through the canal and to the users. Water from the spring that will not be used for outdoor use will now be stored for the Town to have adequate storage for fire suppression and emergency needs.

3. *Does the project promote and encourage collaboration among parties in a way that helps increase the reliability of the water supply?*

Yes, the residents of Henefer and agricultural users located in this project area want the project to happen, and so does Summit County. They all know that they must do something to secure their culinary water, reduce the losses in the irrigation system, reduce infiltration in the sewer system, and allow for water to be stored for longer times in Echo Reservoir and within the Weber River. The reliability of the Town's culinary water system is crucial to the sustainability of the Town, economic viability of the irrigators, residents, and town, and recreation opportunities that make this a livable community.

- *Is there widespread support for the project?*

  Yes, the residents, irrigation users, County, and others all came to several meetings that were held to discuss the project and the alternatives that were presented. The Town made every effort to invite the community to be involved in the process, and many of them were. This is a costly project that will require the residents to begin to pay an annual fee for secondary water. However, as residents participated in the process, they understood the need to reduce the pressure on their culinary system and reduce the water loses in the irrigation system. Years of impacts from drought, infiltration to the wastewater system, flooding of properties, and lack of culinary water continues to influence all water users to want to make changes.

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

  Summit County will expedite any permits needed for construction within the County, as indicated in their letter of support. Henefer Irrigation Company will work hand in hand with Henefer Town throughout the entire project. Weber River Water User's Association is fully in support of this project in that it will benefit the River and other water users as we make an effort to conserve water.

- *Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?*

  Yes, Oakley City has expressed interest in the implementation of this project. The City will be conducting a feasibility study to consider pressurized irrigation throughout their City. Oakley City is in the Weber River Basin and has many of the same issues with their culinary water system as Henefer Town, only on a much bigger scale.

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

  This project will reduce the chance that the Town will run out of culinary water during the summer months when water is at its highest use. It will reduce confits between residents and the elected officials due to water restrictions that happen every year. It will also reduce conflicts between irrigators and residents who have in the past had their basements flooded due to the leaks and loos from the canal every irrigation season.

- *Describe the roles of any partners in the process. Please attach any relevant supporting documents.*

  Letters of support from Henefer Irrigation and Henefer Upper Ditch Company are attached. These two Irrigation Companies will play a big role during the entire project development, as they are partners in the canal. They will be working closely with the Town and will give access to the canals and easements that will be required to build the project. See Attachment E Letters of Support.

4. *Will the project address water supply reliability in other ways not described above?*

No, the project will not address water supply reliability in other ways not described above.

E.1.3. Evaluation Criterion C – Implementing Hydropower (18 Points)

If the proposed project includes construction or installation of a hydropower system, please address the following:

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

The project will increase the production of hydropower by constructing an underwater micro-hydro turbine station that will produce 514 kWh of energy per year. The power will be used at the diversion, measuring station, and SCADA on the canal to meet the power needs of the system at that remote location.

***Describe the amount of energy generated.** For projects that implement hydropower systems, state the estimated amount of energy that the system will generate (in kilowatt hours per year). Provide sufficient detail supporting the stated estimate, including all calculations in support of the estimate.*

The underwater micro-hydro turbine station will produce 2.4 kWh of energy per day. The small hydro turbine will be installed in the channel just upstream of the flume and before the ditch split where the flows will be the highest. This will maximize energy production. The channel will be narrowed at that point to ensure a velocity of at least 13.5 feet per second. This velocity will produce 2.4kWh of energy per day. Henefer Irrigation has a water right for 214 days.

$$2.4kWh\ x\ 214\ days\ = 514\ kWh/year$$

***Describe any other benefits of the hydropower project. D**escribe and provide sufficient detail on any additional benefits expected to result from the hydropower project, including:*

- *Any expected reduction in the use of energy currently supplied through a Reclamation project*

  No expected reduction is known at this time.

- *Anticipated benefits to other sectors/entities.*

  The anticipated benefit is the reduction in the expense to run power from the local power grid to the meter that would be required for this system.

- *Expected water needs, if any, of the system*

  There will not be any additional water needed beyond the required flow through the system for irrigation.

E.1.4. Evaluation Criterion D – Complementing On-Farm Irrigation Improvements (10 Points)

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

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

    Planned on-farm efficiency improvements include eliminating flood irrigation and implementing sprinkler irrigation with secondary and agricultural water users. This is directly supported by the proposed project, which will pipe and pressurize the secondary system. By lining the canal and ditches, the agriculture users along

the canal will have water available to pump out of the canal to run a sprinkling system. This project is the first step to realizing this on-farm irrigation opportunity.

- *Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?*

  Upon completion of the proposed WaterSMART project, farmers will then be eligible to request technical or financial assistance from NRCS for implementing sprinkler irrigation. In the past, many farmers have contacted NRCS regarding eligibility for EQIP funding for the construction of laterals and on-farm sprinkler systems.

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

  Several farmers have committed to contact NRCS. Please see Attachment C On Farm Signature Page for interest in NRCS EQIP program for the signatures and acreage. The farmers that have signed include 37 percent of irrigable acreage.

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

  See Attachment C for the signatures and acreage.

- *Describe how the proposed WaterSMART project would complement any ongoing or planned on-farm improvement.*
  - *Will the proposed WaterSMART project directly facilitate on-farm improvement? If so, how? For example, installation of a pressurized pipe through WaterSMART can help support efficient on-farm irrigation practices, such as drip irrigation.*

    The proposed WaterSMART project will directly facilitate on-farm improvements. Sprinkler irrigation will be made possible by lining the canal, which will provide enough water in the system to allow a farmer to run a pump for a sprinkler irrigation system. The irrigators will be responsible for seeking NRCS funding to implement this on-farm irrigation practice.

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

    N/A

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

    Based upon calculations and information already submitted as part of this application, returned savings in water for agriculture would be between 8 and 10 percent water savings. Better use of water will come about by reducing water wasting, losses due to seepage, and saving of culinary water.

E.1.5. Evaluation Criterion E – Department of the Interior Priorities (10 Points)

Address those priorities that are applicable to your project. Points will be allocated based on the degree to which the project supports one or more of the priorities listed, and whether the connection to the Priority(ies) is well supported in the proposal.

1. *Restoring trust with local communities*

Previously, each year when water was delivered through the canal, water losses have had a significant impact on local residential and farmers properties as it continued to flood and wash away their property. This project will begin to restore trust and reduce conflict by alleviating burdens placed upon others due to water losses in the Henefer Irrigation canal system. In addition, the trust between the Town and its residents will be reestablished as it reduces the use of its precious culinary water on lawns and gardens when this water is in short supply during the hot summer months. The development of the Henefer Town SOR Plan brought the residents of Henefer and the irrigators together to work toward a common goal, including:

- Water conservation
- Implementing greater watering efficiency methods
- Developing a secondary water system that works for both residents and irrigators
- Flow measurement with a reliable flume and SCADA for the canal and meters for each secondary water connection.
- Working toward culinary and irrigation water reliability methods that will reduce costly infrastructure

2. *Modernizing our infrastructure*

As explained previously, Henefer Town and Henefer Irrigation Company developed a SOR to understand better their current and future water demands, system inefficiencies, ways to use irrigation water more resourcefully and to avoid the need to build expensive culinary water infrastructure. This partnership, which supports the White House Public/Private Partnership Initiative to modernize U.S. infrastructure allowed both entities to work through impediments to infrastructure development and to plan an infrastructure project that will serve the needs of their water users. The result of this public/private partnership is the proposed modernized secondary water system that will bring the Town and the irrigation company into the twenty-first century. The development of this project will:

- Cut maintenance times and solve issues related to flooding, weeds, debris, and sediment in the ditches
- Allow real-time water tracking and metering
- Reduce water losses and conflicts with residents and Henefer Town
- Provide opportunities to sprinkle farmland and increase irrigation season
- Facilitate power generation to run the SCADA system associated with the canal flume
- Reduce the use of culinary water for outdoor use
- Reduce water infiltration into the Town's sewer system

E.1.6. Evaluation Criterion F – Implementation and Results (6 Points)

E.1.6.1. Subcriterion No. F.1 – Project Planning

Does the applicant have a Water Conservation Plan and System Optimization Review (SOR) in place? *Please self-certify or provide copies of these plans where appropriate to verify that such a plan is in place.*

See Attachment D SOR Plan Priority Project

Provide the following information regarding project planning:

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

   The Town and the Irrigation Company prepared a SOR to study the best options for them both. They found the best way forward for both Henefer Irrigation and the Town was to develop a secondary water system and to line a considerable length of the canal to conserve not only irrigation water lost within the canal and ditches in town but also the culinary water. The development of the SOR helped them understand their current and future demands, system inefficiencies, ways to use irrigation water more resourcefully to help reduce the use of spring water on lawns and gardens, reduce losses, pressurize the system so more will use it, conserve water, and decrease the need to build expensive culinary water infrastructure.

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

   This project meets the goals of the SOR Plan and is the most cost-effective project to address the majority of both existing and future deficiencies of the Town and to address the water losses within the Henefer Irrigation distribution system. The SOR evaluated many alternatives for both the Town and the Irrigation Company, but the most economical and most effective way to meet the needs of both Town and Irrigation Company came down to recommending developing a secondary water system, which includes lining a significant portion of the Henefer Irrigation main canal and Big Ditch. The lining of the canal will save approximately 918 acre-feet of water annually, making it available for both Henefer Town and the other shareholders of the Henefer Irrigation system. The secondary water project will save 116 acre-feet of culinary water for a total savings of 1,034 acre-feet of total water savings.

E.1.6.2. Subcriterion No. F.2 – Performance Measures

Provide a brief summary describing the performance measure that will be used to quantify actual benefits upon completion of the project (e.g., water saved or better managed, energy generated or saved).

This project has a new flow measurement within the canal that will be used in conjunction with the existing flow measurement device to measure daily and annual flow rates diverted and conveyed. An inflow/outflow test over the irrigation season will be done to determine what water enters the system and what water leaves the system, to determine losses. These will be compared with the historical volumes and flow rates diverted from the river and will give a comparison by which to verify water savings.

After the secondary system is installed, the meters will allow the Town to track the water use by the residential connections and compare those to the culinary meters to show the savings in the culinary system.

An assessment of the estimated power from the hydro turbine will be developed with a projected timeline (May-September) in which the turbine would be in operation to calculate the amount of kWh that will be generated. These monthly reports will be summarized annually in October and reported to the Henefer Irrigation Board.

E.1.6.3. Subcriterion No. F.3 – Readiness to Proceed

Describe the implementation plan of the proposed project. Include an estimated project schedule that show the stages and duration of the proposed work, including major tasks, milestones, and dates.

July 2019 – September 2020
Start Preliminary Design – July 2019
Notice of Award Letter – August 2019
Start EA – August/September 2019
Agreement Review – April 2020
Executed Contract – June 2020
50% Design Review – September/October 2020
October 2020 – September 2021
90% Design Review – December/January 2020
Complete EA (FONSI Issued) – March/April 2021
100% Design Review – March/April 2021
Advertise Project – June/July 2021
Bid Project – August 2021
October 2021 – September 2022
Commence Construction – August/September 2021
Construction Substantial Completion – July/August 2022
Construction Final Completion – August/September 2022

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

Summit County Conditional Use Permit – The County requires a conditional use permit. This will require meeting with the planning commission to request the permit. This is a standard permit granted by the County for the installation of larger diameter piping within the County. They require that the Town have a preliminary design ready before meeting with the County.

Summit County Excavation Permit – Summit County Engineering requires this permit for any construction within the County. This will require a review of the design plans by the County's engineering department. This is a typical permit for any construction activity.

In the past, as the Town has worked with Summit County, these two permits were not obtained until the design was at least 90% complete.

A Utah Pollutant Discharge Elimination System (UPDES) Permits will be required and as part of this permit you must develop a Storm Water pollution Protection Plan. This is all required by the contractor before construction.

If a stream alteration permit is required, it will be prepared at the 30 to 60 percent design stage and will entail a 30-day public review.

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

SOR Plan that included modeling of the canal and secondary system. Cost estimates were developed as part of the SOR Plan to develop priority projects for the Town and Irrigation Company.

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

The Town will implement a secondary water fee and connection ordinance.

Describe how the environmental compliance estimate was developed. Has the compliance cost been discussed with the local Reclamation office?

Cost estimates are based on the past fifteen environmental reports that J-U-B Engineers, Inc. has completed, five of which have been completed within 25 miles of the Henefer Town project.

E.1.7. Evaluation Criterion G – Nexus to Reclamation Project Activities (4 Points)

- *Is the proposed project connected to Reclamation project activities? If so, how? Please consider the following:*
  - *Does the applicant receive Reclamation project water?*

    Yes, out of Echo Reservoir.
  - *Is the project on Reclamation project lands or involving Reclamation facilities?*

    No, not directly; however, the conserved water can maintain instream flows through the Weber River and facilitate the augmentation of water that is stored in the Echo Reservoir.
  - *Is the project in the same basin as a Reclamation project or activity?*

    Yes, the project is located in the Weber River Basin where a number of Reclamation projects are located.
  - *Will the proposed work contribute water to a basin where a Reclamation project is located?*

    Yes, as the project conserves water and reduces losses, Henefer Town and Henefer Irrigation can maintain instream flows within the Weber River, which will help contribute to the storage of Echo and potential flows into Willard Bay and increase the water reliability for Weber Basin Water Conservancy District. It will also allow for and enhance habitats and recreational opportunities in the Weber River. Conserved water will be delivered through the Weber River to Willard Bay, which is a Reclamation project.
- *Will the project benefit any tribe(s)?*

  No, the project will not directly benefit any tribes; however, all water conservation in the Weber River Basin will have some sort of benefit, primarily through the drought years.

E.1.8. Evaluation Criterion H – Additional Non-Federal Funding (4 Points)

State the percentage of non-federal funding provided using the following calculation: Non-Federal Funding divided by Total Project Cost.

$$\frac{1{,}750{,}000}{3{,}250{,}000} = 54\%$$

Project Budget

Funding Plan and Letters of Commitment

Describe how the non-Federal share of project costs will be obtained.

Henefer Town will request a loan from the Permanent Community Impact Board (CIB) in June 2019 for $1,750,000.

Identify the sources of the non-Federal cost share contribution for the project, including:

- *Any monetary contribution by the applicant towards the cost-share requirement and source of funds (e.g., reserve account, tax revenue, and/or assessments)*

  Henefer Town will pay the loan back with monthly fees associated the secondary water and any new connection fees. The secondary water fees will include operation and maintenance cost.

- *Any costs that will be contributed by the applicant*

  N/A

- *Any third-party in-kind costs (i.e., goods and services provided by a third party)*

  N/A

- *Any cash requested or received from other non-Federal entities*

  N/A

- *Any pending funding requests (i.e. grants or loans) that have not yet been approved, and explain how the project will be affected if such funding is denied*

  As stated above, a loan application will be submitted to CIB within the next few months. Henefer Town has been in communication with CIB, who funds more than 90 percent of submitted loan requests. For a project with such significant water and energy savings, Henefer Town feels confident that they will receive the loan from CIB. If the funding were to be denied, they would look to the Department of Water Resources for funding.

In addition, identify whether the budget proposal includes any project costs that have been or may be incurred prior to award. For each cost, describe:

- *The project expenditure and amount*

  Henefer Town followed their procurement process and procured J-U-B Engineers, Inc. in March 2019. They worked closely with their attorney and followed all the federal requirements. They will be starting the preliminary engineering in July of 2019 to help advance the contracting process. As soon as the award is announced, the Town would like to start the environmental process as well. Due to the limited season in Henefer, they feel that they should start the cultural survey and other types of on-the-ground surveys before there is snow on the ground.

- *The date of cost incurrence*

  These are estimated dates:

  Preliminary Engineering July 20, 2019, $216,000

  Environmental Review August/September 15, 2019 $ 108,000

- *How the expenditure benefits the Project*

  The project will be benefited by allowing the Town to move forward earlier if they are awarded the proposed project. They know that they must move forward with this project and that they will need to design this project no matter what. They have a problem with their culinary water system being used for outdoor use and significant losses in the irrigation system. They understand that if they can be ready to move forward, they will be able to advance the project and meet the timeline needed to work outside of the irrigation season.

Budget Proposal

Table 2 – Total Project Cost Table

Source	Amount
Costs to be reimbursed with the requested Federal funding	$1,500,000
Costs to be paid by the applicant	$1,750,000
Value of third party contributions	$0.00
Total Project Cost	**$3,250,000**

Table 3 – Budget Proposal

Budget Item Description	Computation		Quantity Type	Total Cost
	$/Unit	Quantity		
Salaries and Wages				$0.00
Fringe Benefits				$0.00
Equipment				$0.00
Supplies and Materials				$0.00
Contractual /Construction				$0.00
Engineering				**$542,000**
Design 8%	$217,000			$217,000
Construction Management 8%	$217,000			$217,000
Environmental Compliance 4%	$108,000			$108,000
Construction				**$2,708,000**
Permitting – SWPPP & UPDES	$13,556.72	1	LS	$14,000
Furnish and Install 10" C-900 DR 18 PVC (incl. fittings)	$42.96	1,300	LF	$56,000
Furnish and Install 6" C-900 DR 18 PVC (incl. fittings)	$25.20	11,500	LF	$290,000
Furnish and Install 4" C-900 DR 18 PVC (incl. fittings)	$22.10	23,000	LF	$508,000
10" Gate Valve	$2,859.10	2	EA	$6,000
6" Gate Valve	$1,598.44	19	EA	$30,000
Flushing Station	$5,217.99	2	EA	$10,000
Furnish and Install Single service laterals	$1,161.94	20	EA	$23,000
Furnish and Install Double service laterals	$1,739.11	120	EA	$209,000

Water Meters	$484.80	260	EA	$126,000
Water Meters Boxes & Lids	$393.93	260	EA	$102,000
3" Asphalt Repair	$4.00	73,000	SF	$292,000
Clear Grub Site	$2,991.11	4	AF	$12,000
Site Grading	$46,606.79	4	AF	$186,000
Construct 4 AF Reservoir	$46,370.78	4	AF	$185,000
Install Reservoir Inlet & Screening Structure	$6,837.57	1	LS	$7,000
Install Reservoir Outlet Structure w/Trash Rack	$6,790.85	1	LS	$7,000
10 HP Pump Station	$250,000	1	EA	$250,000
Clear and Grade Canal Surface	$10.75	7,600	LF	$82,000
Geotextile, EPDM Liner & Installation	$41.22	7,600	LF	$313,000
Third-Party In-Kind Contributions				**$0.00**
Other				**$0.00**
Total Direct Costs				**$3,250,000**
Indirect Costs				**$0.00**
Type of rate	Percentage	$base		$0.00
Total Estimated Project Costs				**$3,250,000**

Budget Narrative

Salaries and Wages

No Henefer Town Salaries or Wages will be included. All services will be contracted. Henefer Town's staff time will be over and above the cost of the project and will not be counted toward the project cost.

Fringe Benefits

No fringe benefits will be required.

Travel

No travel will be necessary.

Equipment

Equipment will be part of the contracted portion of the project.

Materials and Supplies

Materials and Supplies will be part of the contracted portion of the project and will be documented as required.

Contractual

To determine unit costs, which were included in the cost estimate for this project, Henefer Town relied upon the SOR Plan that was prepared in 2018/19. Contract unit prices from similar projects recently completed were used by the engineering firm to estimate those costs. Henefer Town will follow the State of Utah procurement process for procuring a contractor for this project. They will bid the construction portion of the project to several prequalified construction companies. The contractual costs shown are estimates for each of the components to furnish and install all the pipe, meters, and other items. Generally, the low bidder will be selected based on a determination of acceptable qualifications.

Third-Party In-Kind Contributions

N/A

Environmental and Regulatory Compliance Costs

The total environmental review cost is set at 4 percent of the project at $108,000. It is expected that it will take $93,000 to evaluate the required information, prepare the report, and update any changes required from reclamation. Also included is $15,000 set aside for Reclamation to review the report. The 4 percent is based on past cost for environmental reviews. The $15,000 for review is only an estimate. It is anticipated that it could take less based on prior experience.

Other Expenses

No other expense are included.

Indirect Costs

No indirect costs are included.

Total Costs

Henefer Portion: $1,750,000 Fed Portion: $1,500,000 Total: $3,250,000

Environmental and Cultural Resources Compliance

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

Impacts will be those associated with piping and pressurizing a secondary water system in previously disturbed streets and lining an existing canal system. In the past, similar projects have had minimal impacts. The surface vegetation will be restored upon completion of the project.

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

Henefer Town is not aware of any impacts concerning threatened or endangered species in this area.

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

Henefer Town is not aware of any impacts to wetlands in this area.

When was the water delivery system constructed?

There is no secondary system currently in Henefer Town, and the canal was built in the 1950s. As part of the completed environmental document, the required historical documentation for the project will be completed.

Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

The sections of the canal to be lined will be regraded and lined. Any structures within the sections to be lined may be affected. The canal and associated structures are more than 50 years old. These structures could simply be left in place and accommodated in the lining project, or they may need to be completely replaced. Construction is scheduled to take place in the Fall 2021 and Spring 2022. A cultural resource inventory will be completed as part of the submitted environmental document.

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

A cultural resource inventory will be completed as part of the submitted environmental document.

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

Henefer Town is not aware of any impacts to or locations of archeological sites.

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

No. The secondary water portion of the project will be within the town street right-of-way and will not require any additional land from any residents. They will not require any relocations of residents.

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

No.

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

No.

Required Permits or Approvals

Applicants must state in the application whether any permits or approvals are required and explain the plan for obtaining such permits or approvals.

Summit County Conditional Use Permit – The County requires a conditional use permit for any pipe over 16 inches. This will require meeting with the planning commission to request the permit. This is a standard permit granted by the County for the installation of larger diameter piping within the County.

Summit County Excavation Permit – Summit County Engineering requires this permit for any construction within the County. This will require a review of the design plans by the County's engineering department. This is a typical permit for any construction activity.

UPDES PERMIT – A Utah Pollutant Discharge Elimination System (UPDES) Permits will be required and as part of this permit you must develop a Storm Water pollution Protection Plan. This is all required by the contractor before construction.

If a stream alteration permit is required, it will be prepared at the 30 to 60 percent design stage and will entail a 30-day public review.

Letters of Project Support

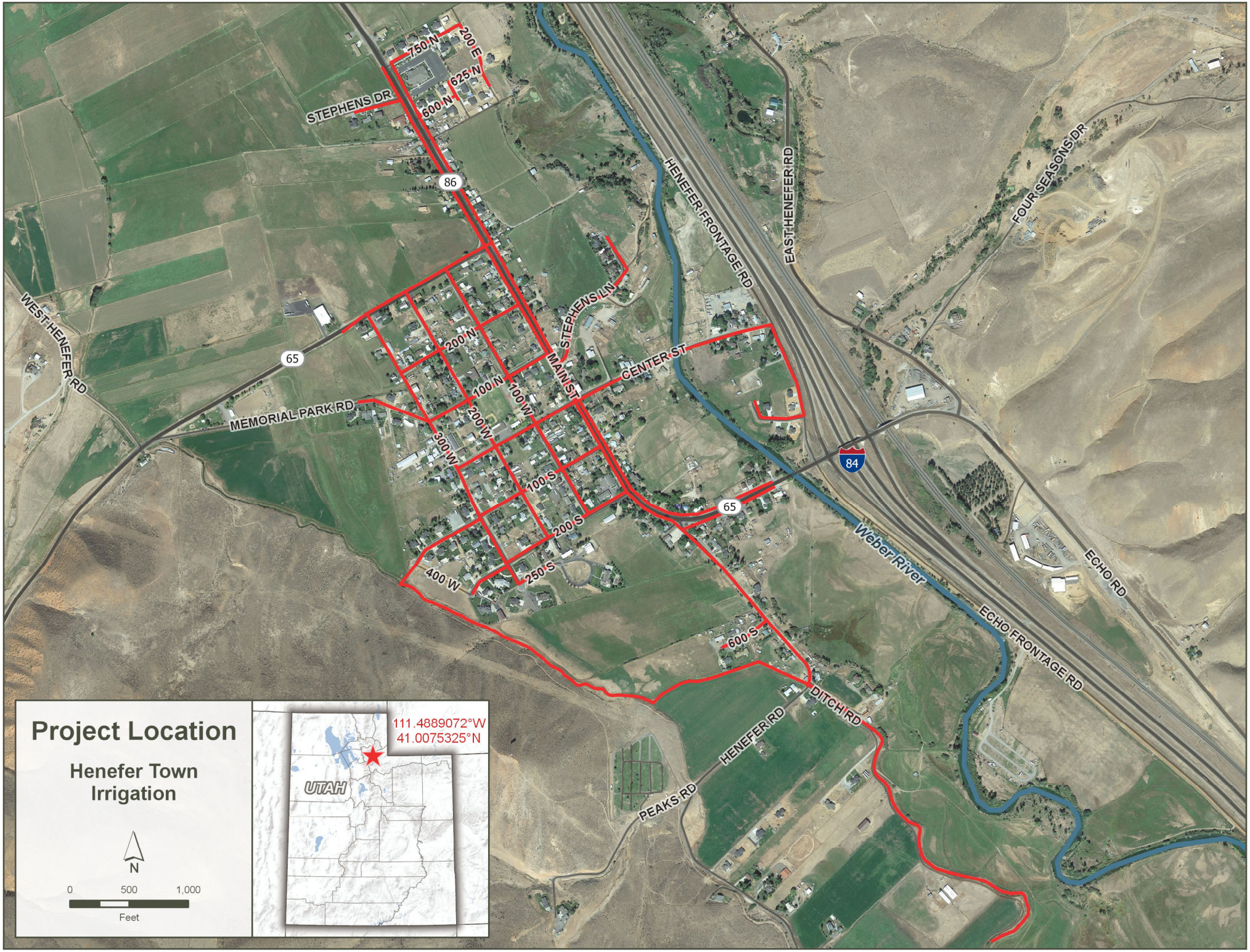
Include letters from interested stakeholders supporting the proposed project.

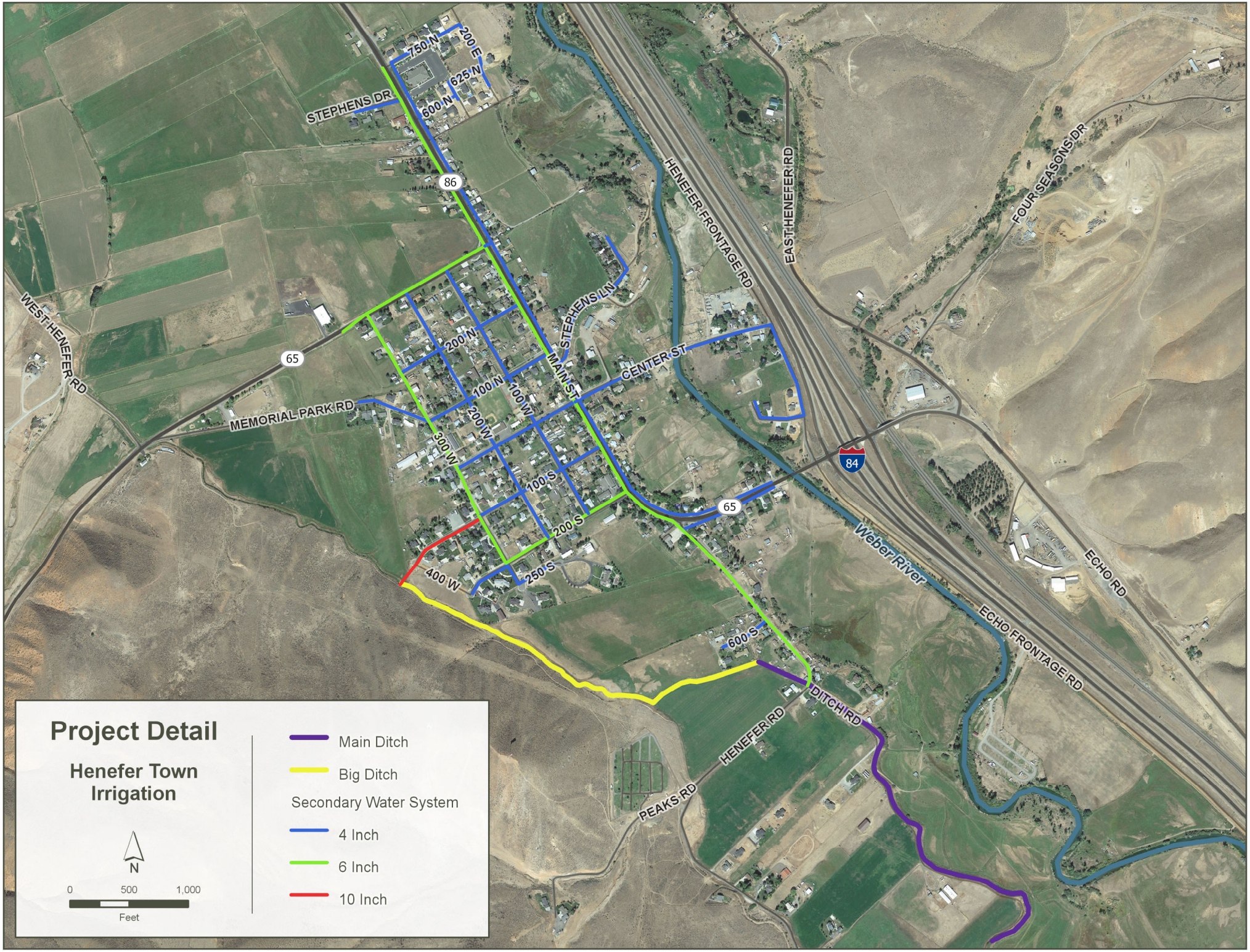
Letters of support have been included from the following, found in Attachment E Letters of Support:
Weber River Water Users Association
Henefer Irrigation Company #1
Henefer Upper Ditch Company
Summit County

Official Resolution

Include an official resolution adopted by the applicant's board of directors or governing body. The official resolution may be submitted up to 30 days after the application deadline.

The Official Resolution for the Henefer Town will be submitted within 30 days after the application deadline.


Project Location
Henefer Town Irrigation
N
0
500
1,000
Feet
UTAH
111.4889072°W
41.0075325°N
STEPHENS DR
750 N
200 E
625 N
600 N
86
HENEFER FRONTAGE RD
EAST HENEFER RD
FOUR SEASONS DR
STEPHENS LN
WEST HENEFER RD
65
200 N
MAIN ST
CENTER ST
MEMORIAL PARK RD
100 N
100 W
200 W
300 W
100 S
200 S
250 S
400 W
84
Weber River
ECHO RD
ECHO FRONTAGE RD
600 S
DITCH RD
HENEFER RD
PEAKS RD


Project Detail
Henefer Town Irrigation
N
0
500
1,000
Feet
Main Ditch
Big Ditch
Secondary Water System
4 Inch
6 Inch
10 Inch
STEPHENS DR
750 N
200 E
625 N
600 N
86
WEST HENEFER RD
65
MEMORIAL PARK RD
200 N
100 N
100 W
200 W
300 W
400 W
MAIN ST
STEPHENS LN
CENTER ST
100 S
200 S
250 S
600 S
HENEFER FRONTAGE RD
EAST HENEFER RD
84
FOUR SEASONS DR
Weber River
ECHO RD
ECHO FRONTAGE RD
DITCH RD
HENEFER RD
PEAKS RD

Henefer Town
On-farm Intent Signatures
FOA# BOR-DO-19-F004

Landowner Name	Claimable Acreage	Landowner Signature I have an interest to install a high-efficiency irrigation system when sufficient water quantity, quality, and application requirements are met.
Tim Richins	70	[illegible]
Grant Richins	120	[illegible]
[illegible]	100	[illegible]
[illegible] Richins	120	[illegible] Richins
[illegible]	18	[illegible]

Henefer Irrigation Company #1
Henefer, UT 84033

March 12, 2019

Mayor Kay Richins
Henefer Town
150 W Center St, PO Box 112
Henefer, Utah 84033

Dear Mayor Richins,

Henefer Irrigation Company #1 is pleased to write in support of your grant application being submitted to the Bureau of Reclamation Water and Energy Efficiency Grants Program. We applaud your efforts to build a secondary water system and to line a length of the canal to conserve both irrigation and culinary water.

Henefer Irrigation Company #1 recognizes the importance of water preservation in our often water-short basin. The water saved through this improvement project will be of benefit to residents, water users, and the regional environment. We applaud your efforts to conserve one of our most precious natural resources.

We strongly support this grant application and appreciate the advancements it will make in conserving valuable irrigation and culinary water resources.

Sincerely,

Tim Richins
President
Henefer Irrigation Company #1

COUNTY MANAGER

SUMMIT COUNTY UTAH

THOMAS C. FISHER

March 13, 2019

Mayor Kay Richins
Henefer Town
150 W Center St, PO Box 112
Henefer, Utah 84033

Re: Letter of Support for Water and Energy Efficiency Project

Dear Mayor Richins,

Summit County is pleased to write in support of your grant application being submitted to the Bureau of Reclamation Water and Energy Efficiency Grants Program. We applaud your efforts to build a secondary water system and to line a length of your canal to conserve both irrigation and culinary water.

Summit County recognizes the importance of water preservation in our often water-short basin. The water saved through this improvement project will be of benefit to residents, water users, and the regional environment. We support your efforts to conserve one of our most precious natural resources.

We strongly commend this grant application and appreciate the advancements it will make in conserving valuable irrigation and culinary water resources.

Sincerely,

Thomas C. Fisher
County Manager

60 North Main • P.O. Box 128 • Coalville, UT 84017
Office (435) 336-3110 • Mobile (970) 640-1757 • tfisher@summitcounty.org

Weber River Project
WEBER RIVER WATER USERS ASSOCIATION
Established 1926
CONSERVE

Weber River Water Users Association

138 West 1300 North • Sunset, Utah 84015-2918 • p (801) 774-6373 • f (801) 774-5424 • WRWUA.org

March 4, 2019

Mayor Kay Richins
Henefer Town
150 W Center St, PO Box 112
Henefer, UT 84033

Re: Letter of Support for Water and Energy Efficiency Project

Dear Mayor Richins,

The Weber River Water Users Association (WRWUA) is pleased to write in support of your grant application being submitted to the Bureau of Reclamation for the Water and Energy Efficiency Grants Program. We applaud your efforts to build a secondary water system and to line a length of your canal to conserve both irrigation and culinary water.

WRWUA recognizes the importance of water preservation and conservation in our often water-short basin. The water saved through this improvement project will be of benefit to regional water users and the environment. We applaud your efforts to conserve one of our most precious natural resources.

We support this grant application and appreciate the advancements it will make in measuring, and conserving valuable irrigation and culinary water resources.

Sincerely,
Weber River Water Users Association

Theo G. Cox
President

HENEFER UPPER DITCH IRRIGATION

March 18, 2019

Mayor Kay Richins
Henefer Town
150 W Center Street
Henefer, UT 84033

RE: Letter of Support for Water and Energy Efficiency Project

Dear Mayor Richins,

Henefer Upper Ditch is pleased to write in support of your grant application being submitted to the Bureau of Reclamation Water and Energy Efficiency Grants Program. We applaud your efforts to build a secondary water system and to line a length of your canal to conserve both irrigation and culinary water.

Henefer Upper Ditch recognizes the importance of water preservation in our often water-short basin. The water saved through this improvement project will be of benefit to residents, water users, and the regional environment. We support your efforts to conserve one of our most precious natural resources.

We strongly commend this grant application and appreciate the advancements it will make in conserving valuable irrigation and culinary water resources.

Sincerely,

Brian Adams
Henefer Upper Ditch President

4.2 Water Rights

The town currently has water rights representing 272 acre-feet of annual diversion volume and 431 gpm maximum flow rate. Using the state guidelines, the annual volume will be exceeded between 2020 and 2030. By 2040, 459 acre feet will be required which represents an additional 187 acre feet. Using state guidelines, the diversion flow rate will be exceeded between 2020 and 2030. By 2040, 761 gpm will be required which represents 330 gpm of additional flow.

If a secondary system is constructed, then the Henefer Irrigation shares will be used instead of culinary water rights to meet outdoor water requirements. The difference is substantial in that there are no additional water rights required by 2040. Table 8 summarizes the future water rights needed both with and without a secondary system.

Table 8 – Additional Future Water Rights Required

	Volume (Acre-Feet)	Flow (CFS)
Without Secondary	187	330
With Secondary	0	0

4.3 Storage Improvements

The Level of Service established in Section 2 and the System Analysis discussed in Section 3 both assume that there is not a secondary water system in Henefer. If there is not secondary system, then the system needs an additional 100,000 gallons to meet the existing level of service and 650,000 gallons additional storage to meet the required level of service in 2040.

If a secondary water system is constructed, then the need for outdoor equalization storage on the culinary system is eliminated and adjusted level of service is shown in Table 9.

Table 9 - Storage Level of Service with a Secondary Water System

	Existing (2018) gal	2020 gal	2030 gal	2040 gal
Equalization (Indoor Use)	125,600	131,200	167,200	245,200
Fire Suppression	120,000	120,000	120,000	120,000
Emergency Storage	296,177	309,383	394,274	578,206
Total	**541,777**	**560,583**	**681,474**	**943,406**

If a secondary water system is constructed, then the need to construct additional storage for the current indoor needs is eliminated and the storage required for 2040 is reduced to 375,000 gallons.

- Without a secondary system the existing storage is needed now. A 650,000-gallon tank is needed to meet the 2040 level of service at an estimated cost of $900,000. (See Appendix C.)
- With a secondary system the current storage is exceeded by 2030. A 375,000-gallon tank is needed to meet the 2040 level of service at an estimated cost of $600,000. (See Appendix C.)

4.4 Distribution Improvements

In preparation of this report we consulted with the Summit County Fire Marshall. The Fire Marshal has indicated 1,000 gpm with 20 psi residual pressure is adequate for all Henefer. The only area in town that currently can't meet this flow is the church house on the north end of town. The system can only deliver 500 gpm at that location. There are parallel lines on either side of Main Street that are not connected. The modeling shows that if these lines are connected then 1,000 gpm can be provided at the church house under both the existing and 2040 flow condition.

This improvement is estimated to cost approximately $32,000 to complete. A cost estimate is included in Appendix C.

5.0 Henefer Irrigation Analysis

The Henefer Irrigation Company (HIC) diverts water out of the Weber River about 2 ½ miles East of the Town of Henefer midway between Henefer and Echo Dam. HIC has 975 share and irrigates 1157.5 acres of land. The average annual diversion for HIC from state records is 4,702 acre-feet. Henefer Irrigation Company also owns shares of stock in the Weber River Water User's Association which has storage in Echo Reservoir. Their ditch system consists of the main ditch, the Big Ditch, the Middle Town Ditch and the Back Town Ditch. The main ditch runs about 4,500 feet from the point where it is diverted out of the Weber River to a constant head orifice (CHO) structure where the water is measured. Below the CHO the ditch delivers water to fields east of Henefer. On the South side of Henefer Town where it splits into the Big Ditch and the town ditches. The main ditch and the Big Ditch are open and unlined earthen ditches. The town ditches are a combination of piped and open ditch sections through the Town of Henefer. The Big Ditch takes approximately 76% of the flow of the main ditch. The Big Ditch, Middle Town Ditch and Back Town Ditch all deliver water to fields on the North side of Henefer Town.

5.1 Water Loss Study

A water loss study performed on August 13, 2018. The section studied was on the main Henefer Irrigation Ditch from the CHO structure to the split. The main ditch splits into the Big Ditch and Middle & Back Ditch at that location. Appendix A includes a drawing that depicts the location of different features including flow measurement locations for the water loss study. The chart below summarized the water loss study.

Table 10 – Water Loss Study

Location	Description	Flow (cfs)	Outflow (cfs)	Loss (cfs)	Loss (%)	Distance (ft)	Distance (mi)	Loss (cfs/mi)
CHO	Measurement Structure	34.5						
Bob Richins	Head Gate		5.2					
Ditch Road	Culvert	20.7		8.6	24.9%	8606	1.63	5.3
Big Ditch	Concrete Structure	4.8						
Middle & Back	Parshall Flume	15.3						
Sum West & MB		20.1		0.6	2.9%	500	0.09	6.3
TOTAL LOSS				9.2				

Flows were measured using either an existing flow measurement structure (CHO and Parshall Flume) or using a velocity probe to measure water velocities within a control section with known dimensions and calculating a flow rate.

Annual water loss for the main Henefer Irrigation Ditch was calculated by applying the loss rate (as determined in the table above) to the average annual diversion rate for the main ditch as published by the State of Utah.

Main Henefer Irrigation Ditch - CHO to Split		
Length	1.63	Miles
Mean Diversion (From State)	4702	AF
Measured (8/13/18)	24.9%	Total lost flow
Calc. Annual Loss	1172	AF
Calc. Loss/Mile	**719**	**AF**

NRCS Soil Surveys indicate that the Big Ditch and the main Henefer Irrigation Ditch are in similar soils with similar transmittivity rates. The ditches are observed to be in the same condition, so the assumption is that the water losses within the Big Ditch will be like those in the main ditch. The Big Ditch takes approximately 76% of the flow of the main ditch after the split so water loss in terms of acre-feet per mile of ditch was assumed to be proportional to the flow rates.

Big Ditch - After Split		
Measured % split	76%	
Calc. Loss/Mile (76% Main)	**546**	**AF**

The seepage loss calculations for the Big Ditch are easily determined once the annual volume loss per mile of ditch are determined.

Big Ditch - Split to Highway 65		
Length	6100	ft
Length	1.15	mile
Calc. Annual Loss	**628**	**AF**

The total seepage losses calculated from this study are 1350 acre-feet. There are thousands of feet of additional smaller ditches that weren't included in the study. The main ditch and Big Ditch represent largest ditches with the highest flows.

This water could be saved if the ditches were piped or lined.

5.2 Options for Piping or Lining

This analysis includes treatment of only the main Henefer Ditch from the CHO to the split and only the section of the Big Ditch from the split to Highway 65. There are other ditches not included in this evaluation including the main ditch from the river diversion above the CHO, the Big Ditch past Highway 65, the Middle Town Ditch and the Back Town Ditch.

The segments considered include 9,150 feet of the main Henefer Ditch and 6,100 feet of the Big Ditch.

5.2.1 Piping Option

The elevation change within the section to be piped isn't enough to allow pressurization so the pipe was modeled as non-pressurized open channel pipe flow. Pipe material was assumed to be High Density Polyethylene (HDPE) as that material can more easily be installed to follow a meandering alignment such as the existing ditch alignment.

The cost to pipe the canal is $2,784,000. The cost estimate is included in Appendix C.

5.2.2 Lining Option

The canal lining portion would use a geotextile and an Ethylene Propylene Diene Monomer (EPDM) liner. The EPDM liner is essentially a rubber liner which is UV resistant and has seamed joints for a 100% water tight seal between the water and the soils. The liner would be protected from livestock by fencing.

The cost to line the canal is $1,288,000. The cost estimate is included in Appendix C.

6.0 Conclusions and Recommendations

Henefer Town has existing deficiencies in the areas of source, storage and distribution. Any projects to address existing deficiencies should be of adequate size and capacity to address needs at least through the planning window of this report which is 2040. The town also has future deficiencies in water rights.

Henefer Irrigation is losing a significant volume of water to seepage.

6.1 Recommended Projects

The most cost-effective project to address most of both existing and future deficiencies is the construction of a secondary water system.

6.1.1 Projects to Address Existing Deficiencies

Project 1 - Secondary Water System

The secondary water system addresses existing deficiencies in both the source and storage as follows:

- Existing culinary water sources are adequate until at least 2040.
- The existing culinary storage will be adequate volume until sometime between 2020 and 2030.

Part of the recommended secondary water system includes lining a significant portion of the Henefer Irrigation main canal and Big Ditch. The cost estimate included in Appendix C includes lining approximately 7,600 liner feet of the Henefer Irrigation system. The lining will save approximately 918 acre-feet of water annually, making it available for both the Henefer Town and the other shareholders of the Henefer Irrigation system.

Project 2 – Franklin Spring Rehabilitation

This project is currently under design with plans to construct in the fall of 2019. This project will provide additional culinary source and provide a buffer until the Secondary Water System can be complete.

Project 3 - Main Street Water Line Looping

Connecting the lines across main street in 2 locations is addresses the existing deficiency that exists with distribution system with inadequate fire flow.

6.1.2 Projects to Address Existing Deficiencies

The secondary water project addresses the future culinary source and water right deficiencies. The Main Street water line looping project addresses all future distribution deficiencies.

Project 4 - 375,000 Gallon Storage Tank

The only remaining future deficiency is 375,000 gallons of additional storage that will be required by 2040. The existing storage will be exceeded sometime between 2020 and 2030.

6.2 Summary of Recommended Projects

Table 11 summarizes the recommended projects including the cost and recommended schedule.

Table 11 – Summary of Recommended Projects

Project	Deficiency Addressed	Cost (Rounded)	Priority	Year
Secondary Water System	Source/Storage/Water Rights	$ 3,200,000.00	1	2022
Franklin Spring Redevelopment	Source	$ 100,000.00	2	2019
Main Street Looping	Distribution	$ 30,000.00	3	2020
New 375,000 Gallon Tank	Storage	$ 600,000.00	4	2030

WEBER BASIN WATER CONSERVANCY DISTRICT

2837 East Highway 193 • Layton, Utah 84040 • Phone (801) 771-1677 • (SLC) 359-4494 • Fax (801) 544-0103

Report Date: 10/06/2015

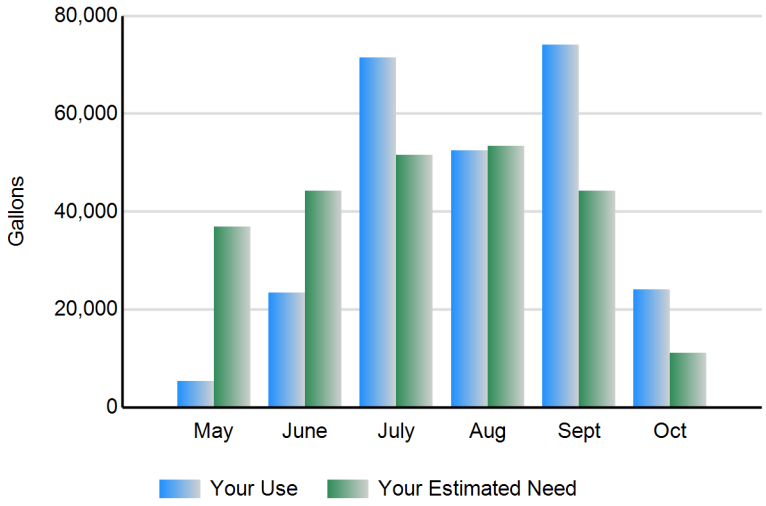
Weber Basin Water Conservancy District
MEASURE THE DIFFERENCE
Learn More. Use Less.

Sample User
123 Sample St.
Sample City, USA

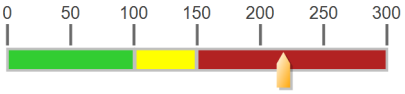
SECONDARY WATER USE REPORT

Meter Number: 2010310892 | Usage period: 9/14/2015 through 10/1/2015

Previous Meter Read		Current Meter Read		Water Used This Month	Elapsed Days	Average Daily Use This Month	Year to Date Use
Date	Reading	Date	Reading				
09/14/15	1,562,725	10/01/15	1,586,829	24,104 gal.	17	1,418 gal.	250,716 gal.



Your Landscape Area (sq ft)	Your Water Need Based on Your Landscape Area This Month	This Months % of Use to Est. Need
11,882	11,050 gal.	218



Your landscape area is derived from aerial imagery and encompasses your entire lot according to county records, excluding your home and driveway footprint. Estimated need is calculated from 30yr average evapotranspiration values for each month.

If you would like to receive this report by email, contact us at conservation@weberbasin.com with your name and account number, or call us at 801-771-1677.

Thank you for your efforts in helping to conserve water this year. As one of our planet's most precious natural resources, we need all the help we can get!

Weber Basin advises opening your main irrigation valve to allow your system to drain properly now that our system has been shut down. It should be closed again by April 1st, 2016 to prevent water from entering your system without your knowledge prior to next years irrigation startup.

If you have questions or comments on this report, please contact us @ 801-771-1677.

Weber Basin's
Water Conservation
Learning Garden
2837 E. Hwy 193, Layton Utah