The Bureau of Reclamation

WaterSMART Grants:
Water and Energy Efficiency Grants

Bear River Canal Company

FY 2020

BOR-DO-20-F001

West Main Canal Liner Project

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Executive Summary

Applicant Info

Date: October 3, 2019
Applicant Name: Bear River Canal Company (BRCC)
City, County, State: Tremonton, Box Elder County, Utah
Project Manager:

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Project Manager/Engineer
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Project Funding Request: Funding Group II $1,500,000; Total Project Cost $3,031,600

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 project is to line a 3,200-foot section of the West Main Canal with a concrete liner. The Bear River Canal Company (BRCC) West Main Canal Liner Project will conserve 6,412 acre-feet of water lost to a 100-year-old partially lined canal that sits atop an unstable hillside. The hillside next to the canal has been unstable for over ten years. BRCC has taken several measures to stabilize the hillside but fears that the only reasonable solution is to line the canal. The West Main Canal sits above the Bear River and is the main canal that provides all the water to two other large canals in BRCC's system. The project will allow for a large water savings that will bring water reliability to farmers downstream and improve crop production. In addition, this project will provide increased safety and security to the Boy Scout Camp just below the canal.

Photo 1 Canal Hillside Sluffing off /Boy Scout Camp

The bottom portion of the West Main Canal is unlined, and the downgradient bankside is partially lined. This canal has had several repairs over its lifetime, but it has become evident that the canal needs to be fully lined to provide protection and security for the canal and the hillside.

The project will install 3,200 feet of reinforced concrete liner within the 44-foot-wide open canal. The water reliability and protection of the canal has many of the water users concerned. Such a significant amount of water travels through the West Main Canal that in the event of hillside failure due to water loss, extreme damage could occur to the canal as well as surrounding areas.

The proposed project will contribute to the goals of this FOA in the following ways:

Better Manage 230,000 Acre-feet and Conserve 6,412 Acre-feet of Water per Year: The West Main canal carries 230,000 acre-feet of water per year and delivers to 54,700 acres of irrigated land. 84 percent of all water for the BRCC is delivered through this canal, and hundreds of water users count on this water. This project will allow BRCC to better manage all 230,000 acre-feet of water. The proposed project will also conserve 6,412 acre-feet of water or 2.7 percent of the overall flow, allow BRCC to reduce seepage damage to surrounding areas, and completely line a canal that is now only partially lined.

Photo 2 West Main Canal

Safety and Water Reliability: The Bear River Canal System serves 65,490 acres of agricultural farmland. The West Main Canal serves approximately 54,800 acres or 84 percent of the total service area. The project is located at the start of the West Main Canal at a location where the canal is built on a steep hillside with visible sluffing off of the hillside below the canal.

Photo 3 Broken concrete liner on the West Main Canal

Failure of this canal would result in property damage, potential loss of life, loss of water to farmers and crops, and would have a critical impact on the economy of this area. Failure in this location would leave 956 shareholders without water. The implementation of this project will relieve the fear of a canal breach, eliminate seepage losses, and give confidence and peace of mind to the campers at the Scout Camp.

Length of Time and Estimated Completion Date

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

The project is ready to move forward as soon as it is awarded. The environmental reports and the final design will take an estimated twelve months to complete. Bidding will take place thereafter,

and construction will be completed in two one-year phases outside of irrigation season. As soon as construction is complete, project details and costs will be finalized, and the final report prepared and submitted. The project is expected to span the entire three-year allowance; July 2020 – July 2023.

Federal Facility

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

This project is not located on a Federal Facility; however, BRCC receives water through Cutler Reservoir. Cutler Reservoir belongs to PacifiCorp, which has senior rights to the flows that are stored in Hyrum Reservoir, which is a Reclamation Project. Hyrum Reservoir provides water to run the PacifiCorp hydroelectric facility on the Bear River. PacifiCorp has an obligation to deliver all BRCC's water through Cutler Reservoir.

Background Data

BRCC has served many farmers and residents of Box Elder County for over 100 years, beginning around 1890. The original owner of the seven canals and four laterals was the U&I Sugar Company. The sugar company used the canals to supply irrigation water to sugar beet farmers in the area during the summer months and for processing sugar in the fall and winter months. The primary purpose of BRCC canals today is to provide irrigation water for a variety of crops that are produced within 65,490 acres of the service area of the canals.

The project is located on the West Main Canal, which is 31 miles of earthen and partially lined canal that diverts about 730 CFS or 230,000 acre-feet per season. There are 956 shareholders along the West Main Canal with 36,498 shares of the water that comes through the West Main Canal. This Canal has had its share of difficulty in delivering adequate water to the end of the canal.

In addition to the loss of water, the hillside has been and continues to be vulnerable to instability as rocks and soil slough off the side of the hill, making it susceptible to small landslides. A Safety Management Plan (SMP) was recently completed that identified the proposed project area as "very high risk" which, according to the SMP, the canal water surface is higher than the surrounding ground and failure could cause loss of human life. The hillside is steep, and BRCC fears that as they continue to fill the canal year after year, it may contribute to the vulnerability of the hillside. With Camp Fife, a BSA Scout Camp, located below the canal, there is concern that the vulnerability of the hillside is potentially creating an even more dangerous situation for the campers below.

In 2017, NRCS evaluated and classified the soils along all the BRCC canals based on permeability. The soils along this canal were classified into the highest permeability class. To view the Study, see Attachment A – NRCS Soil Report Summary.

Water Supply

Describe the source of water supply, the water rights involved, current water uses (e.g., agricultural, municipal, domestic, or industrial), the number of water users served, and the current and projected water demand. Also, identify potential shortfalls in the water supply. If water is primarily used for irrigation, describe major crops and total acres served.

Source of water supply and water rights involved.

Water flows from Bear Lake through the Bear River, which flows into the Cutler Reservoir where it is delivered through two diversion structures and canals that are owned by PacifiCorp. The two canals are the West Main Canal and the Hammond Canal. The West Main Canal carries 730 cfs flow, and the Hammond Canal carries 175 cfs flow.

Bear River Water Rights:

Water Right (29-)	Source	Quantity	Priority Date
2633	Bear River	14,496.44 ac-ft	1904
2856	Bear River	333.0 cfs or 100,031.544 ac-ft	1889
2857	Bear River	133.0 cfs	1901
2858	Bear River	43.0 cfs	1914
3321	Bear River	300.0 cfs or 72,124.56 ac-ft	1987

Current water uses and number of water users served.

The vast majority of the water use (based on volume) is agricultural, with 65,490 irrigated acres. Secondary water uses are very limited and are only recently occurring in new residential developments that have installed their own secondary systems; and mostly within incorporated cities. There are over 2,000 water users in the service area, and 956 of those water users will benefit from the proposed West Main Canal Liner Project.

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

Current demands are approximately 275,000 acre-feet, based on water shares. However, much less than that is delivered because of seepage losses in the canals. Local laws and policy changes, growth, and climate change have reminded BRCC of the external risks and demands placed upon them and their water supply. A list of potential water demands includes the following:

- **New Secondary Water Demands** - Water to serve new residential, industrial, and commercial users who will require new secondary water opportunities. Many of the towns and cities in the BRCC service area hold shares in BRCC. As communities grow, their residents are going to demand secondary water opportunities to avoid having to flood irrigate their properties.
- **Water Shortage** - Tremonton City, the second largest community in the BRCC service area, is already suffering from the impact of residents using culinary water to water their lawns and gardens. They are concerned they will soon be short on culinary water. They

have prepared a secondary water plan that has 12 service areas for the entire City. They have constructed the secondary water distribution system in 3 of the 12 service areas. These areas are using BRCC water for the secondary water supply.

- **Growth** - Growth and land use conversions are a real concern for the BRCC service area. Water required to help meet the growing needs of municipal and industrial areas will need to be evaluated and planned for. Water conversion strategies need to be developed to help meet the needs of a growing population. Over the next twenty years, residential populations in Box Elder County are estimated to nearly double. This population change has prompted BRCC to make efforts to prepare and evaluate their water management plans. They understand that they need to prepare for greater secondary water needs beyond their existing agricultural users. BRCC is currently completing a Water Conservation and Management Plan to identify areas of concern and create a plan to continue to meet the needs of the water users in the future. As part of this planning process, the area for this project has been identified as a key focus area because it is so critical to so many of the water users. See Attachment B – Draft Management Plan for info on the project priority list.

Potential Shortfalls in Water Supply: BRCC faces potential shortfalls in four main areas:

1. Water Loss – The number one potential shortfall for BRCC is water losses through seepage. These losses have impacted water delivery, caused damage to fields and basements, and reduced crop yield for shareholders. Visual inspections show water seeping from the canal. The project area for consideration is a partially lined area of the canal. Water is seeping through the canal, adding to the instability of the slope. The vulnerability of the hillside and the possibility of a breach in this area if the hillside were to fail, causes the company a great deal of anxiety. This would eliminate the water supply to over 54,700 acres and put lives at risk.
2. Past Drought and the Economy – BRCC potential shortfalls from drought can and have had an impact on the current water supply. The BRCC service area is home to some of Utah's highest producing farms, which still rely solely on farming as their only source of income. Extreme drought conditions in the past have had economic impacts on the BRCC service area. In 2001-2003, the BRCC service area experienced intense drought and was affected by both reduced water availability and economic impacts. Within the 2003 Economic Report to the Governor of Utah, it indicates that "the hardest hit sector (related to the drought) was agriculture, where 2,600 jobs and almost $40 million in income was lost."
3. Drought Conditions Today – According to the "Drought Impact Reporter" in 2018, "Utah's reservoirs were averaging 47 percent of capacity statewide, due to several months of hot, dry weather. As reservoirs continued to drop after the high demand during the summer, next year's water supply will be in jeopardy."

   Drought can impact not only BRCC but the areas with which their water rights are stored. In 1911, a canal was constructed that now diverts almost all the water in the Bear River at Stewart Dam southward to Mud Lake. From there, when spring runoff water is being

stored, the water flows through Mud Lake to enter Bear Lake. The rest of the year, it flows through Mud Lake and out the Outlet Canal to rejoin the original Bear River channel. The upper 6.5 meters of Bear Lake function as a reservoir. The Lifton Pumping Station releases water from Bear Lake to the Bear River during the summer for irrigation. The water levels in the lake fluctuate annually with these releases.

BRCC stores many of their water rights within Bear Lake. In 2002 - 2004, due to an extended drought, Bear Lake reached its lowest level in 70 years. The seepage losses along the West Main Canal will only complicate any new drought situation. The water losses from seepage, potential flooding, and drought conditions make this a high priority project.

4. Growth – Over the past 10 years, the BRCC service area has seen a 25 percent population increase with many new residential housing developments, businesses, schools, and churches. The impact of growth is revealed by the need to convert water from agricultural uses to residential uses – lawns and gardens. According to the Utah Governor's Water Task Force Committee, agricultural water usage was 80 percent of the total water used in 1995. Today, however, the use is approximately 55 percent for agriculture. The 25 percent difference is water that has been converted from agricultural crop production to residential outdoor use for lawns, gardens, parks, schools and churches, and municipal and commercial needs.

   As the population increases in the service area, the need for more culinary and secondary water will also increase. This demand could have significant effects on BRCC's ability to provide water the way it has always been accustomed to, and could also have an impact on available water based upon drought conditions and transmission water losses from seepage or unlined/unenclosed distribution systems.

If water is primarily used for irrigation, describe major crops and total acres served.

Major crops include wheat, hay, onions, mint, melons, and corn. Box Elder County is also home to many fruit orchards. Total acres served is 65,490.

Water Delivery System

Describe the applicant's water delivery system as appropriate. For agricultural systems, please include the miles of canals, miles of laterals, and existing irrigation improvements (e.g., type, miles, and acres). For municipal systems, please include the number of connections and/or number of water users served and any other relevant information describing the system.

BRCC owns and operates roughly 124 miles of canals that distribute and deliver irrigation water across 65,490 acres of land. Two main canals come out of Cutler Reservoir, with the West Main Canal on the north side of the Bear River and the Hammond Canal on the south side of the Bear River. PacifiCorp maintains the first 0.7 miles of these two main canals just downstream of Cutler Dam.

These canals split into multiple canals, as shown below:

Table 1 Length and Flows of the BRCC Canals

BEAR RIVER CANAL COMPANY CANALS			
Name	**Length (miles)**	***Max Flow (cfs)**	**Notes**
West Main	31	730	
East Main	24	350	
Central	15	150	
Highline			Operated and maintained by others
Hammond Main	9	175	
Hammond West	18	120	
Hammond East	15	55	
Iowa String	4	55	
Lateral A	2	35	
Lateral B	3	100	
Lateral D	2	55	
Lateral F	1	25	
TOTAL	**124**		

*Estimated maximum irrigation flow at diversion point under normal operating conditions.

BRCC delivers water to over a 100 ditch companies, and has many elements to maintain, inspect, and supervise.

Table 2 BRCC Component Inventory

CANAL COMPONENT INVENTORY SUMMARY	
ITEM DESCRIPTION	TOTAL
Major Diversion Structures:	3
Bridges:	159
Culverts:	53
Debris Racks:	14
Discharge Points:	33
Flumes:	40
Foot Bridges:	69
Head Gates:	527
Highway Bridges:	85
Highway Culverts:	9
Inlets:	85
Inverted Siphons:	3
Sections of Lined Canal:	45
Monitoring Stations:	5
Sections with No Road:	24

Service Area: BRCC delivers irrigation water to farmers and residents in an area of approximately 65,490 acres in Box Elder County. The BRCC service area includes areas within Box Elder County. The service area includes:

- Fielding
- Deweyville
- Bear River
- Garland
- Elwood
- Corrinne
- Tremonton
- Honeyville
- Brigham City

Other unincorporated areas that are within the BRCC service are:

- Riverside
- Thatcher
- Collinston
- Bothwell
- Penrose

Hydropower/Energy Efficiency

If the application includes a hydropower component, describe existing energy sources and current energy uses.

BRCC will construct a flume where the Hammond Canal splits into the Hammond East Canal and the Hammond West Canal. The project includes installing the flume on one of the canals just downstream of the split. The flume will include a telemetry system that will allow BRCC to see real time flow data so they can monitor how much flow is going down both canals at any given time and adjust as necessary. This will allow for more efficient use of the water by users that are served by the East and West canals. The hydro turbine will be installed downstream of the flume in a faster section of canal and will power the telemetry equipment. The hydro unit will be a 2 kWh Ampair UV100 that will produce 504 kilowatts of power.

Relationship with Reclamation

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

The Bear River Canal Company has received two grants from Reclamation, which include:

- 2017 WaterSMART Energy Efficiency Grant to line the East Hammond Canal. The project is under contract and in the environmental review process. The project will be completed in September 2019.
- 2017 Field Service Conservation Grant to prepare Conservation Water Management Plan. This planning project is underway and will be completed in August 2019.

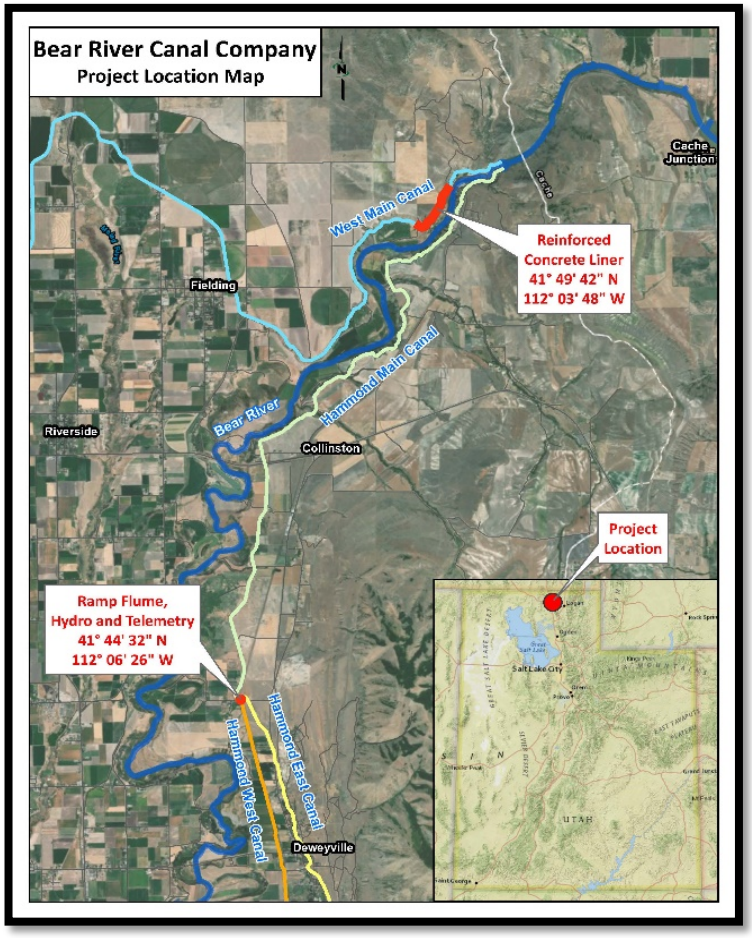
Project Location

Provide specific information on the proposed project location or project area including a map showing the geographic location. For example, {project name} is located in {state and county} approximately {distance} miles {direction, e.g., northeast} of {nearest town}. The project latitude is {##°##'N} and longitude is {###°##'W}.

Geographic Location

The West Main Canal Concrete Liner Project is located in Box Elder County, Utah. It sits 3.6 miles northeast of Fielding, Utah (Latitude 41°49'32.74"N, Longitude 112° 3'56.76"W). For a project location map and detailed project map, see Attachment C – Project Location Map and Attachment D – Project Detail Map.

Figure 4 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.

This project includes lining 3,200 feet of the West Main Canal, and installing a flume and 2.4 kWh hydro turbine. This work will consist of reshaping and lining the canal with reinforced concrete, and with water tight joints. The project will reshape the canal to its originally designed cross section. Once shaped, import material will be placed and compacted in order to provide a suitable foundation for the concrete. If soft spots or unsuitable subgrade material is encountered, it will be over-excavated and replaced with import material. Geotextile-Fabric will also be used in these areas to prevent the imported material from migrating to the unsuitable layer. Once the foundation is in place and at grade, steel reinforcement will be placed. The final step of the construction process will include placement of the concrete on the foundation material and around the reinforcing steel. Once complete, the contractor will clean up the surrounding area and revegetate any disturbed soils. The flume will be built at the split of the Hammond West and Hammond East canals on one of the canals just downstream of the split. The flume will include a telemetry system, and the hydro turbine will be set just downstream of the flume to run the telemetry 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.*

By lining a section of the West Main Canal, this project will conserve 6,412 acre-feet of water or 2.7 percent of the overall flow currently lost to seepage.

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 seeping out of the canal is currently being lost into the underlying soils of the canal and out of the adjacent hillside.

Describe the support/documentation of estimated water savings. *Provide sufficient detail supporting how the estimate was determined, including all supporting calculations.*

Measurements were taken utilizing Acoustic Doppler Current Profiler (ADCP) technology. An ADCP transmitter was mounted to a boat and made to travel back and forth across the channel a total of six times to provide six flow measurements at the two measurement locations.
The ADCP transmitter gathers velocity data in hundreds of small "bins" through the flow cross section. By multiplying the velocity of flow within each bin by the area of the bin, the flow through each bin is calculated. The flows from the bins are then summed to determine the overall flow within the specified cross section. The average total flow measured from the six measurements at each site is used as the flow for that location. Please See Attachment E – ADCP Output Data

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.*

   As previously stated, measurements were taken utilizing Acoustic Doppler Current Profiler (ADCP) technology to determine seepage losses. An ADCP transmitter was mounted to a boat and made to travel back and forth across the channel a total of six times to provide six flow measurements at the two measurement locations.

   The ADCP transmitter gathered velocity data in hundreds of small "bins" through the flow cross section. By multiplying the velocity of flow within each bin by the area of the bin, the flow through each bin was calculated. The flows from the bins were then summed to determine the overall flow within the specified cross section. The average total flow measured from the six measurements at each site was used as the flow for that location.

   The average annual water savings as a result of the project is determined to be 6,412 acre-feet due to the anticipation of zero seepage losses with a concrete lined canal.

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.

Flow measurements were taken on the West Main Canal on September 10, 2019. Pacificorp controls the diversion into the canal and the amount of flow that enters the canal. BRCC met with PacifiCorp staff prior to the measurement study and asked if Pacificorp could hold the flows entering the canal at a constant rate during the time of the flow study. Pacificorp agreed to do this.

Measurements were taken utilizing Acoustic Doppler Current Profiler (ADCP) technology. The use of ADCP technology allows for a much greater degree of accuracy than other methods. An ADCP transmitter was mounted to a boat and made to travel back and forth across the channel a total of six times to provide six flow measurements at the two measurement locations. The two measurement locations are shown in Attachment D-2– Flow Measurement Map

The ADCP transmitter gathers velocity data in hundreds of small "bins" through the flow cross section. By multiplying the velocity of flow within each bin by the area of the bin, the flow through each bin is calculated. The flows from the bins are then summed to determine the overall flow within the specified cross section. The average total flow measured from the six measurements at each site is used as the flow for that location.
The upstream measurement was taken at Station 43+00 which is just slightly downstream of the starting point for the planned liner because the velocities were too high, and the water surface was too rough to get accurate flow measurements at the liner start point. The ADCP boat calculated a flow of 655 cfs. The measurement recorded a standard deviation of 18.3 cfs or 2.8 percent.

The downstream measurement was taken at Station 75+00 which is just slightly downstream of the end point for the planned liner, because the end point is on a sharp bend that creates unfavorable conditions for flow measurement. The measurement was taken just after the bend in a straighter section of the canal. At this point, the ADCP boat calculated a flow of 636 cfs. The measurement recorded a standard deviation of 14.7 cfs or 2.3 percent.

Figure 5 Station 43+00 Water Loss Study

The output data from the ADCP unit for these two measurement sites is included in Attachment E – ADCP Output Data.

There are four diversion head gates in the canal between Station 44+00 and Station 75+00 that were diverting a total of 1.14 cfs on September 10th. The first gate diverts 0.64 cfs. The second gate diverts 0.2 cfs. The third gate serves Camp Fife and was closed for the season prior to September 10th. The fourth gate is just downstream of the Camp Fife gate and diverts 0.3 cfs.

The net loss of 17.9 cfs on September 10th between Station 43+00 to 75+00 represents 2.7 percent of the total flow and an irrigation season volume loss of **6,412 acre-feet** based on the 181-day irrigation season. At the time of this measurement, the flow in the canal had been reduced roughly 65 cubic feet per second (cfs) below the flow that occurs throughout the summer (720 cfs). It is likely that the actual volume lost during the irrigation season is greater than the volume calculated, based on the September 10th measurements.

Figure 6 Station 75+00 Water Loss Study

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)?*

Seepage losses are expected to be zero upon completion of this project.

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?*

The annual transit loss reductions are expected to be 10,580 acre-feet per mile.

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

BRCC will use a portable Acoustic Doupler Profiler, as they did for the seepage evaluation. This will allow them to isolate the flow measurements used in canal loss verifications specific to the 3,200 feet of new liner included in this project.

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

Geotextile Fabric – Geotextiles will serve to separate the imported liner backfill from native soils in areas where unsuitable or soft subgrade material is encountered. Geotextile will be specified in accordance with NRCS Design Note 24, "Guide for the Use of Geotextiles."
3000 psi Concrete – Concrete will compose the main component of the liner. The concrete cement will be Type II Portland Cement Concrete with 3000 psi compressive strength. The minimum thickness will be 8 inches on the floor and 6 inches on the side slopes. Concrete specifications will follow customary ACI and ASTM standards.
PVC Water Stop – PVC water stop will be placed in the joints of the concrete in order to assure a watertight seal. The water stop will be cast into the concrete and will be centered on the cold joints. The water stop will be a Center bulb with a number of parallel ribs or protrusions on each side of the strip center and will meet ACI and ASTM standards.

Imported Backfill – At least 9 inches of the crushed base will be used under the side slopes, and at least 12 inches of foundation rock will be used under the base of the canal. The foundation rock will provide bridging and stability as well as allow for drainage. The imported liner backfill, in general, provides for a better-graded surface for concrete placement.

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)?*

In the western United States, drought will always be the primary issue impacting water reliability. However, seepage due to crumbling and failing infrastructure has caused additional water reliability concerns in the BRCC service area. Because of the compromised hillside in the project area, BRCC fears that the lost water is energizing the instability of the hillside instead of reaching the farms for which it was intended.

- *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.*

This project will begin to lessen anxiety and give the Company and its users the ability to conserve 6,412 acre-feet of water and reduce the need to shut down the canal. This will reduce water reliability concerns and the risk of potential conflicts that come from the fear of crop and economic loss.

The conserved water will remain in the West Canal and be distributed to shareholders. Water saved by this project will also help contribute to the storage and potential flows in the Bear River and eventually to the Great Salt Lake. The Bear River is the main tributary to the U.S. Fish and Wildlife Service Bear River Migratory Bird Refuge and the Great Salt Lake. By conserving water and allowing water to move throughout the Bear River, it will improve habitats and enhance recreational opportunities.

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

The concrete lining will prevent seepage into the banks of the canal, allowing the conserved water to stay in the canal and be distributed to shareholders. Water will remain in the canal and help remedy water shortages instead of being lost to the soils.

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

6,412 acre-feet will be conserved and put to beneficial use by providing irrigation for shareholders within the BRCC service area.

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/or users (e.g., agriculture, municipal and industrial, environmental, recreation, or others)?*

The project involves support from its local water users; Pacificorp, the general public, and the BSA Scout Camp. The hillside along the entire project area is compromised due to landslides, falling rocks, and debris. If this were to continue and worsen, there would be severe property damage to the Camp Fife access road and campgrounds; and could potentially cause loss of life. Collaboration between the Boy Scout Camp and the Canal Company is ongoing to assure that both camping and water delivery can occur in this area. With the completion of this project, both activities – camping and water delivery – are more secure.

Photo 2 Hillside with soil and rocks slipping away

- *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.*

  There are no known threatened or endangered species within the project area; therefore, the project will not have a direct benefit. However, water that makes it to the end of this canal goes directly to the U.S. Fish and Wildlife Service Bear River Migratory Bird Refuge that has many habitats that are used by many federally listed species.

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

  The State of Utah has a goal of 25 percent conservation by the year 2050. This project will help the State move towards this goal, as BRCC has 6,412 acre-feet of water savings annually from this project

- *Will the project benefit Indian tribes?*

No, the project will not have a direct benefit to Indian tribes.

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

The project is located in a rural area that is made up of mostly agriculture fields and small rural towns. Some small cities within the BRCC service areas are considered economically disadvantaged due to the lack of employment and based on the Medium Adjusted Gross Income (MAGI) for the area. Some cities within the service area have a MAGI that is $9,000 less than the state average of $44,451.

- *Describe how the project will help to achieve these multiple benefits. In your response, please address where the conserved water will go and 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 conserved water will remain in the West Canal and be distributed to shareholders. Water saved by this project will also help contribute to the storage and potential flows in the Bear River and eventually to the Great Salt Lake. The Bear River is the main tributary to the U.S. Fish and Wildlife Service Bear River Migratory Bird Refuge and the Great Salt Lake. By conserving water and allowing water to move throughout the Bear River, it will improve habitats and enhance recreational opportunities.

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

As was stated previously, the project involves support from its local water users, Pacificorp, the general public, and the BSA Scout Camp. The hillside along the entire project area is compromised due to landslides, falling rocks, and debris. If this were to continue and worsen, there would be severe property damage to the Camp Fife access road and campgrounds; and could potentially cause loss of life. Collaboration between the Boy Scout Camp and the Canal Company is ongoing to assure that both camping and water delivery can occur in this area. With the completion of this project, both activities – camping and water delivery – are more secure.

- *Is there widespread support for the project?*

Yes, shareholders are in favor of any project that saves water and that sustains its reliability to be delivered. BSA is supportive of improvements that will be made near Camp Fife, and Pacificorp is also supportive of the project.

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

Trust between the shareholder and water company is paramount in this rural agricultural area. By completing the proposed project, BRCC will reduce the amount of water being lost to the ground and provide peace of mind to the general public and campers below. This project also reduces the potential risk of a canal failure and loss of crops. This project allows BRCC to work with PacifiCorp to make improvements to the canal at the location where the ownership of the canal transitions from PacifiCorp to BRCC.

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

Past WaterSMART projects by other irrigators, such as Davis and Weber Counties Canal Company, have encouraged BRCC to move forward with their conservation projects. BRCC and its water users are even more encouraged to move forward on other projects using their own funds. By evaluating BRCC's water losses, they have developed priority projects that will offer greater water conservation and allow the Company to have a sustainable, reliable water delivery system. BRCC's current water loss situation, based on information from studies by NRCS and their own Water

Conservation and Management Plan, will continue to guide them in implementing future water conservation improvements.

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

There is tension in the area because of the number of days the canal was shut down in the 2018 irrigation season and the impact it had on farmer's crops; and eventually on their bottom line. The vulnerability of the hillside required the Company to reduce the flows in the canal to check to see if it was adding to the landslides of the hillside. BSA decided to close the camp for the rest of the irrigation season as a safety precaution. No litigation has occurred, but if the canal has a catastrophic failure, users are going to face economic issues, and the scout camp area will be affected. This project will help prevent a water-related crisis associated with the West Main Canal liner. Although this project is only a small area within the West Main Canal, it is one of the most important areas because it has had the most issues over the past twenty years.

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

There will be no partners participating in the project.

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

The proposed project will allow for conserved water to remain within Cutler Reservoir and Bear Lake for longer periods of time, making water more reliable to those areas. It will also allow water to reach the end of the canal and then flow into the Bear River Migratory Bird Refuge.

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.*

BRCC will install a 2 kWh crossfloat turbine for this site. The project will increase the production of hydropower by constructing an underwater micro-hydro turbine station that will produce 100 kWh of energy. The power will be used to run the telemetry at the flume 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 at the split of the Hammond East and West canals in the flume where the flows will be the highest. This will maximize the energy production. The channel will be narrowed at that point to increase velocities to produce the needed energy for the telemetry. BRCC has a water right for 181 days.

2.4kWh x 181 days =434 kWh/year

Describe any other benefits of the hydropower project. Describe 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.*
  The amount of power generated with this project is small enough that it will not have any impact on PacificCorp's power generation facilities.
- *Anticipated benefits to other sectors/entities.*
  Power to run the meter will allow for improved SCADA readings and more efficient use of water.
- *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.*
    This project will help provide a safer, more reliable, and more efficient water delivery system for the canal. This will allow farmers to pipe ditches and laterals and install sprinklers and pivots. These types of improvements will permit their irrigation systems to be more efficient and will also allow for higher crop yields and less flooding potential in residential neighborhoods that are continually encroaching on the agricultural lands.
  - *Have the farmers requested technical or financial assistance from NRCS for the on-farm efficiency projects, or do they plan to in the future?*
    Farmers representing an additional 500 irrigated acres have indicated interest in making the change from flood irrigation to sprinkler irrigation.
  - *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.*
    Farmers have only indicated their interest but have not formally signed a letter of intent. Only the ones previously listed above have already applied with NRCS and are currently waiting for ranking to implement an EQIP on-farm piping project.
  - *Applicants should provide letters of intent from farmers/ranchers in the affected project areas.*
    Farmers have only indicated their interest but have not formally signed a letter of intent. Only the ones previously listed above have already applied with NRCS and are currently waiting for ranking to implement an EQIP on-farm piping project.

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

      The installation of a canal liner through WaterSMART will provide a system that is more efficient and will reduce water loss. It will give the shareholders access to conserved water, which will allow them to exercise their full share allocation. This project will also help instill confidence in the water users that there is a reliable source of water that can be used by improved infrastructure on their farms.

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

      N/A

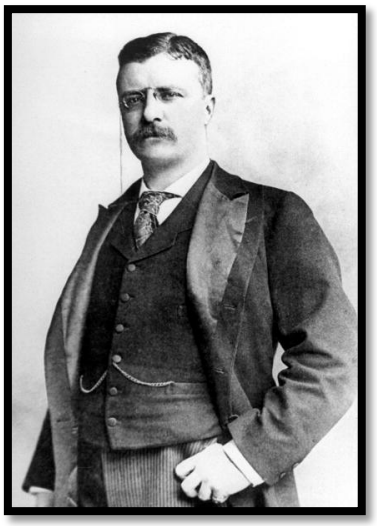
- *Describe the on-farm water conservation or water use efficiency benefits that would result from the on-farm component of this project.*
    - *Estimate the potential on-farm water savings that could result in acre-feet per year. Include support or backup documentation for any calculations or assumptions.*

      Based on the calculations and information already submitted as part of this application, returned savings in water for agriculture would be 2.7 percent. Better use of the water will come about by reducing water wasting and losses due to seepage. This request has outlined the water savings in detail.

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. *Creating a conservation stewardship legacy second only to Teddy Roosevelt.*



Teddy Roosevelt once said, "The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired, in value." Like Teddy Roosevelt, shareholders in the BRCC value the importance of conserving water, as it is their most precious natural resource. Many of the farms that use BRCC water have been passed down through families, from one generation to the next; and will continue to do so. BRCC takes protecting their water resource very seriously and feels they have a generational-linked responsibility to do all they can for the water resource.

The proposed project will live up to this shared legacy by assuring that the water that was previously being lost will now go to producing more crops. This project also protects the canal resource by reinforcing a section of canal that has shown volatility.

2. *Utilizing our natural resources.*

BRCC recognizes the value of water in the Nation's second driest state. Over the last ten years, Utah has seen drier than normal conditions escalating to a record breaking dry 2018; couple that with the fact that Utah's population is projected to grow by 2.5 million people in the next 35 years, and the implications call for some serious infrastructure improvements.

Research expects that parts of the Western U.S. where the ground is usually 90-100 percent covered in snow during the winter will see almost half as much snow by the year 2035. Brian McInerney, a hydrologist for the National Weather Service office in Salt Lake City said, "Utah appears to be warming two to three times faster than the rest of the world." Having more rain and less snow isn't inherently a problem, but Utah's water systems are designed to work in tandem with the current climate. "The system we have now works wonderfully because when we don't really need the water, we store it in the mountains as snow," McInerney said. Shifting to more rain and less snow could render the system incapable of providing enough water to support Utah's future population, McInerney said, because rain tends to be less predictable. Without an effective means of collecting and storing it for later use, runoff from rain seeps rapidly into the soil and is taken up by plants.

BRCC believes that by maximizing the efficiency in which they can deliver the resources under their stewardship, future generations will have access to adequate amounts of water. Careful and thoughtful planning need to happen now to mitigate the foreseen stresses that will be placed on current systems.

3. *Restoring trust with local communities.*

BRCC understands that the water delivered in the canal is directly tied to the financial well-being of their shareholders. A significant amount of trust is put on BRCC to ensure that the resource is being appropriated and used in the fairest way possible. Any action that protects or reinforces the reliability of water, or conserves it, proves to the shareholders that BRCC takes water seriously.

On a related note, and as mentioned previously, the BSA removed its scouts from their camp last year because of concerns regarding the unstable hillside above the camp. This project will also significantly strengthen the trust between BRCC and BSA.

4. *Modernizing our infrastructure.*

The proposed project will contribute to modernizing local infrastructure. The new canal liner that will be installed with this project will reinforce a canal bank that is not properly functioning. The canal liner will be built to the latest design standards. Modern infrastructure design prides itself in outliving the useful life of old infrastructure design, and BRCC is confident that the new canal liner will live up to this expectation and provide the water reliability necessary to better provide for its water users. This project will help put BRCC in a position that will allow them to line more of their canals in the future to conserve additional water.

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/or 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.
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.*

   BRCC completed a companywide Water Conveyance Facility Safety Management Plan in January 2015. As part of this plan, a prioritized list of areas of safety concern was developed. See Attachment F – Safety Priority Project List. Not only were these areas noted as unsafe, but they were areas where water was being lost. In the spring of 2017, BRCC addressed the first Project on this list - the East Hammond Canal Lining Project. The West Main Canal Liner Project ranks second in priority on this list.

   Currently, BRCC is in the process of developing a system-wide Water Conservation and Management Plan. As part of that Plan, the West Main and Hammond Canals near Cutler Reservoir have been identified as the number one areas of focus. This is due to the fact that these canals provide all of the water to the BRCC shareholders. Any water saved along either of these two canals will benefit a considerable number of water users. These canals need to be improved and made more reliable to provide a more secure supply of water.

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).*

   As mentioned above, the West Main Canal Liner Project has surfaced to the top of the list in both the Safety Management Plan and the Water Conservation and Management Plan. By constructing this project, not only does it conserve and provide more water for many shareholders, but it also resolves another safety concern that could mitigate any future water delivery issues. This canal is the main water supply for the shareholders.

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).

BRCC will use a portable Acoustic Doupler Profiler to measure the flow along the new section of the canal. This will allow them to isolate the flow measurements used in canal loss verifications specific to the 3,200 feet of new liner included in this project. The difference, if any, will be the new canal seepage losses. This will be compared to the loss number calculated in the flow loss study completed on September 10, 2019.

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 2020 – September 2021

Agreement Signed and Environmental: July 2020 – September 2021
Design: December 2020 – July 2021
Advertising and Bidding: August 2021 – September 2021

October 2021 – April 2022
Construction Phase 1: October 2021 – April 2022
Construct Hydro: March – April 2022
October 2022 – July 2023
Construction Phase 2: October 2022 – April 2023
Project closed out: July 2023

Describe any permits that will be required, along with the process for obtaining such permits.
No permits are expected to be required. All the work is within the canal right-of-way and not within any streets or rivers.

Identify and describe any engineering or design work performed specifically in support of the proposed project.
A preliminary design was done to develop the cost estimate. No other design work has been done.

Describe any new policies or administrative actions required to implement the project.
Recently, BRCC completed a system-wide Water Conservation and Management Plan. As part of that Plan, the West Main and Hammond Canals near Cutler Reservoir have been identified as the number one areas of focus. This is because these canals provide all the water to the BRCC shareholders. Any water saved along either of these two canals will benefit a considerable number of water users. These canals need to be improved and made more reliable to provide a more secure supply of water.

These areas have been identified as highest priority and board members have passed the motion to proceed with the proposed project. No new administrative actions will be required in order to implement the lining of the West Main Canal.

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 for WaterSMART Projects in the past six years, one of which was for BRCC.

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?*
  BRCC receives water through Cutler Reservoir. Cutler Reservoir belongs to PacifiCorp, which has senior rights to the flows that are stored in Hyrum Reservoir, which is a Reclamation Project. Hyrum Reservoir provides water to run the PacifiCorp hydroelectric facility on the Bear River. PacifiCorp has an obligation to deliver all of BRCC's water through Cutler Reservoir.
- *Is the project on Reclamation project lands or involving Reclamation facilities?*
  No.
- *Is the project in the same basin as a Reclamation project or activity?*
  Yes, the project is in the Bear River Basin where several Reclamation projects are located.

- *Will the proposed work contribute water to a basin where a Reclamation project is located?*
  Yes, the project will conserve water and reduce losses and will help contribute to the storage and potential flows in the Bear River and eventually to the Great Salt Lake. The Bear River is the main tributary to the Bear River Migratory Bird Refuge and the Great Salt Lake. By conserving water and allowing it to remain in the Bear River, it will enhance habitats and recreational opportunities.

Will the project benefit any tribe(s)?

No, the project will not have a direct benefit to Indian tribes.

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.

$$\frac{\$1,531,600.00 \text{ BRCC Funding (Non-Federal)}}{\$3,031,600.00 \text{ Total Project Cost}} = 51\%$$

Project Budget

Funding Plan and Letters of Commitment

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

For their contribution, BRCC will use money from a Utah Board of Water Resources loan and funds from assessments.

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).*

  BRCC has committed $230,000 from their cash reserve account that is required as they request a loan from Utah Division of Water Resources (DWRe). They will make application in October 2019 for a loan for $1,301,600.
- *Any costs that will be contributed by the applicant.*

  BRCC is required to contribute 15 percent of the project cost when they receive a loan from DWRe. This is above any grant funds received from Reclamation or any other granting agency. BRCC will be coming with $230,000 cash fund from their own shareholders.
- *Any third-party in-kind costs (i.e., goods and services provided by a third party).*

  There are no incurred in-kind project costs included in this project.
- *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 DWRe within the next month. BRCC has been in communication with Water Resources, who funds more than 90 percent of submitted loan requests. For a project with such significant water and energy savings, BRCC feels confident that they will receive the loan from DWRe. If the funding were to be denied, they would look to the open market

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.*

  N/A
- *The date of cost incurrence.*

  N/A
- *How the expenditure benefits the Project.*

  N/A

Budget Proposal

Table 3 – 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	$1,531,600
Value of third-party contributions	$0.00
Total Project Cost	**$3,031,600**

Table 4 – 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				**$3,031,600**
Contractual				**$380,000**
Environmental	$35,000	1	EA	$35,000
Design	$212,273	1	EA	$212,000
Construction Observation	$133,000	1	EA	$133,000
Construction				**$2,651,600**
Mobilization	135,000.00	1	EA	$135,000.00
Subgrade Prep	$30.00	3,200	LF	$96,000.00
Foundation Stabilization	$27.00	5,400	CY	$145,800.00
Underdrain System and Drain Rock Base Layer	$450,000.00	1	EA	$450,000.00
Line Main Canal with Concrete, build vehicle access and make headgate improvements	$525.00	3,200	LF	$1,680,000.00
Import of Embankment Material	$27.00	2,400	CY	$64,800.00
Materials Testing Services Allowance	$15,000.00	1	LS	$15,000.00
Construct Ramp Flume and Walls	$50,000.00	1	EA	$50,000.00
Telemetry	$7,500.00	1	EA	$7,500.00
Hydro	$7,500.00	1	EA	$7,500.00
Third-Party In-Kind Contributions				**$0.00**
Other				**$0.00**
Total Direct Costs				**$3,031,600**
Indirect Costs				**$0.00**
Type of rate	Percentage	$base		$0.00
Total Estimated Project Costs				**$3,031,600**

Budget Narrative

Salaries and Wages

No BRCC Salaries or Wages will be included. All services will be contracted. BRCC'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

In order to determine unit costs, which were included in the cost estimate for this project, BRCC relied upon contract unit prices from similar projects recently completed. BRCC 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 and equipment. Generally, the low bidder will be selected based on a determination of acceptable qualifications.

J-U-B Engineers, Inc. has been working with BRCC for over three years as they helped them write their Safety Management Plan. J-U-B then helped the company with the Hammond East Canal Lining Project, which included project design and construction management. J-U-B is currently preparing BRCC's Water Conservation and Management Plan.

The Engineering fees have been evaluated to ensure that they are fair and reasonable, based on the Bureau of Labor Statistics wage rates for engineers.

Third-Party In-Kind Contributions

No third-party in-kind contributions.

Environmental and Regulatory Compliance Costs

The total environmental review cost is $35,000. It is expected that it will take $30,000 to evaluate the required information, prepare the report, and update any changes required from reclamation. Also included is $5,000 set aside for Reclamation to review the report. The amount is based on past cost for environmental reviews. The $5,000 for review is only an estimate. It is anticipated that it could take less, based on past experience.

Other Expenses

No other charges will be included.

Indirect Costs

No indirect costs will be part of the project.

Total Costs

BRCC Portion: $1,531,600 Fed Portion: $1,500,000 Total: $3,031,600

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 excavation and construction. The project improvements will take place entirely within the existing rights-of-way. In the past, similar projects have had minimal impacts. After construction is complete, the surface vegetation will be restored.

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?

BRCC 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.

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

When was the water delivery system constructed?

The system was constructed between 1870 and 1887. Many improvements have been made over the years. 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 project area has old concrete liner located along the downgradient bankside for approximately 580 feet. This old concrete liner will be removed and disposed of as part of the project.

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.

BRCC is not aware of any building, structures or features that would qualify. 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?

BRCC 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 project will not require a right-of-way or relocations from adjacent properties and will have no impact on residential uses within the study area.

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.

No permits are expected to be required. All the work is within the canal right-of-way and not within any streets or rivers.

Letters of Project Support

Include letters from interested stakeholders supporting the proposed project.

Letters of Support can be found in Attachment G – Letters of Support.

Chesapeake Duck Club – J.T. Bowen, President
U.S. Fish and Wildlife Services Bear River Migratory Bird Refuge – Erin Holmes, Project Leader
J.Y. Ferry & Son, Inc. – Joel M. Ferry, Treasurer
PacifiCorp – Devin Pharis, Director, Hydro East
Boy Scouts of America – Jeremy Bell, Camping Director

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 Bear River Canal Company (BRCC) West Main Canal Liner Project will be submitted within 30 days after the application deadline.

Attachment A

USDA

January 4, 2017

To: Nathaniel Todea
Wallace F. Bennett Federal Building
125 South State Street, Room 4010
Salt Lake City, Utah 84138

Dear Nathaniel,

December 20th we participated in a teleconference regarding the Bear River Canal Company system of canals surrounding Tremonton, Utah. Based on the teleconference, they are developing a master plan for the system and applying for grant money for improvements. They would like our assistance to identify areas where they can get the most bang-for-their-buck or could benefit the most from improvements. They will start doing work this summer. Any information we can provide them ahead of time would help. A preliminary review of the soils of the area based on the soil maps follows below. This review should only be used as one planning tool of many and should be followed-up with on-site investigations to evaluate conditions present in the field.

Summary:

Physical limitations – seepage potential and permeability:
Hammond East canal, Highline canal, and large sections of West Main canal have the highest permeability ratings and potential for seepage.

Seepage losses are a primary concern for canal performance. Ideally, during construction canal earth materials are compacted to reduce permeability and seepage losses. Saturated hydraulic conductivity was used as a proxy for the inherent ability of the soil to limit seepage losses. Attached is a map of the Bear River Canal network with associated soil permeability classes. The methodology used to create permeability classes is included in Appendix A.

Chemical limitations – water quality implications:
East Main and Central canals have limiting amounts of salts including gypsum and sodium that may be affecting water quality and system maintenance.

High amounts of salts, including gypsum and sodium can cause issues with canal construction, maintenance, and contaminate water lowering the overall quality. Salts in the soil can make it difficult to compact a soil, increase susceptibility to piping and subsidence, and cause maintenance issues due to dispersion. Additionally, high salt contents can limit revegetation of earthen structures and dissolve into canal and seepage waters, accumulating at the discharge point. Attached is a map of the Bear River Canal network with associated soil chemistry limitation classes. The methodology used to create limitation classes is included in Appendix B.

Natural Resources Conservation Service
125 South State St., Room 4010, Salt Lake City, UT 84138
Voice 801 524-4550 Fax 1-844-715-4928

USDA

Please contact me with any additional questions regarding this project.

Regards,

Meredith Albers, CPSS
Resource Soil Scientist, USDA-NRCS
Wallace F. Bennett Federal Building
125 South State Street, Room 4010
Salt Lake City, Utah 84138-1100
Office: 801-524-4572-----Cell: 385-249-6482-----FAX: 801-524-4403
meredith.albers@ut.usda.gov

Appendix A: Soil Permeability Classes:

Current soil maps contain estimates for saturated hydraulic conductivity (k_{sat}, micrometers/second) of unaltered soil horizons or layers. These estimates are determined based on guidelines for similar materials and have not been validated in the field. For each major soil component, the k_{sat} value of the least conductive horizon and the most conductive horizon was selected. All horizons were used in the analysis with typical depth of the soil profile to 60 inches, some as deep as 80 inches. Using Figure 3-10 from Chapter 3 of the National Engineering Handbook (see Appendix), k_{sat} was correlated to an estimated permeability class when compacted: pervious, semi-pervious, and impervious.

Table 1. Approximate permeability of soil materials when compacted based on saturated hydraulic conductivity of unaltered soil.

k_{sat} (micrometers/sec)	Permeability when compacted
Less than 0.5	Impervious
0.5 to less than 5.0	Semi-pervious
5.0 and greater	Pervious

Each major soil component received a permeability rating when compacted for the low k_{sat} value and the high k_{sat} value. Six permeability classes were then assigned in Table 2.

Table 2. Permeability class of native soil materials based on the combination of the highest and lowest permeabilities once compacted.

Lowest Permeability when Compacted	Highest Permeability when Compacted	Permeability Class
Impervious	Impervious	1
Impervious	Semi-pervious	2
Semi-pervious	Semi-pervious	3
Impervious	Pervious	4
Semi-pervious	Pervious	5
Pervious	Pervious	6

USDA

National Engineering Handbook:

Figure 3–10 Engineering properties of Unified Soil Classes

Typical names	Requirements for seepage control						Unified soil classes
	Shear strength	Compress-iblity	Workability as construction material	Permeability			
				When compacted	K cm/s	K ft/d	
Well-graded gravels, gravel-sand mixtures, little or no fines	Excellent	Negligible	Excellent	Pervious	$K > 10^{-2}$	K > 30	GW
Well-graded gravels, gravel-sand mixtures, little or no fines	Good	Negligible	Good	Very pervious	$K > 10^{-2}$	K > 30	GP
Silty gravels, gravel-sand-silt mixtures	Good to fair	Negligible	Good	Semi-pervious to impervious	$K = 10^{-3}$ to 10^{-6}	$K = 3$ to 3×10^{-3}	GM
Clayey gravels, gravel-sand-clay mixtures	Good	Very low	Good	Impervious	$K = 10^{-3}$ to 10^{-6}	$K = 3 \times 10^{-3}$ to 3×10^{-6}	GC
Well-graded sands, gravelly sands, little or no fines	Excellent	Negligible	Excellent	Pervious	$K > 10^{-3}$	K > 3	SW
Poorly graded sands, gravelly sands, little or no fines	Good	Very low	Fair	Pervious	$K > 10^{-3}$	K > 3	SP
Silty sands, sands silt mixtures	Good to fair	Low	Fair	Semi-pervious to impervious	$K = 10^{-3}$ to 10^{-6}	$K = 3$ to 3×10^{-3}	SM
Clayey sands, sand-silt mixtures	Good to fair	Low	Good	Impervious	$K = 10^{-6}$ to 10^{-8}	$K = 3 \times 10^{-3}$ to 3×10^{-5}	SC
Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	Fair	Medium to high	Fair	Semi-pervious to impervious	$K = 10^{-3}$ to 10^{-6}	$K = 3$ to 3×10^{-3}	ML
Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays	Fair	Medium	Good to fair	Impervious	$K = 10^{-6}$ to 10^{-8}	$K = 3 \times 10^{-3}$ to 3×10^{-5}	CL
Organic silts and organic silty clays of low plasticity	Poor	Medium	Fair	Semi-pervious to impervious	$K = 10^{-4}$ to 10^{-6}	$K = 3 \times 10^{-1}$ to 3×10^{-3}	OL
Inorganic silts, micaceous or diatomaceous fine sandy or silty soil, elastic silts	Fair to poor	High	Poor	Semi-pervious to impervious	$K = 10^{-4}$ to 10^{-6}	$K = 3 \times 10^{-1}$ to 3×10^{-3}	MH
Inorganic clays of high plasticity, fat clays	Poor	High very high	Poor	Impervious	$K = 10^{-6}$ to 10^{-8}	$K = 3 \times 10^{-3}$ to 3×10^{-5}	CH
Organic clays of medium to high plasticity, organic silts	Poor	High	Poor	Impervious	$K = 10^{-6}$ to 10^{-8}	$K = 3 \times 10^{-3}$ to 3×10^{-5}	OH
Peat and other highly organic soils	Not suitable for construction						PT

Note: Soil k_{sat} is populated in micrometers/second. There are 10,000 micrometers in 1 centimeter.

Natural Resources Conservation Service
125 South State St., Room 4010, Salt Lake City, UT 84138
Voice 801 524-4550 Fax 1-844-715-4928

USDA

Appendix B: Soil Chemistry Limitation Classes:

Current soil maps contain estimates for percent gypsum by weight, sodium adsorption ratio (SAR) and salinity (approximated by electrical conductivity, EC in mmhos/cm) of unaltered soil horizons or layers. These estimates are determined based on guidelines for similar materials and have not been validated in the field. As salt content in a soil increases, the suitability of the soil for construction materials, water conveyance and storage decreases. For each major soil component, the maximum gypsum content, SAR, and EC of any horizon was selected. All horizons were used in the analysis with typical depth of the soil profile to 60 inches, some as deep as 80 inches. Existing soil interpretations for surface water management systems and embankments, dikes, and levees were used as similar land practices to identify limiting levels of salt content. The more conservative values were used in this preliminary assessment. Data voids or null values in the data set exist for miscellaneous land types and did not receive a rating.

Table 3. Limitation classes for soils used for an irrigation canal system based on the maximum value of selected soil chemical properties.

Limitation Classes	Soil Property		
	Gypsum, %	SAR	EC, mmhos/cm
Not Limited	<1	<4	<4
Somewhat Limited	1 to <25	4 to <13	4 to <16
Very Limited	≥25	≥13	≥16

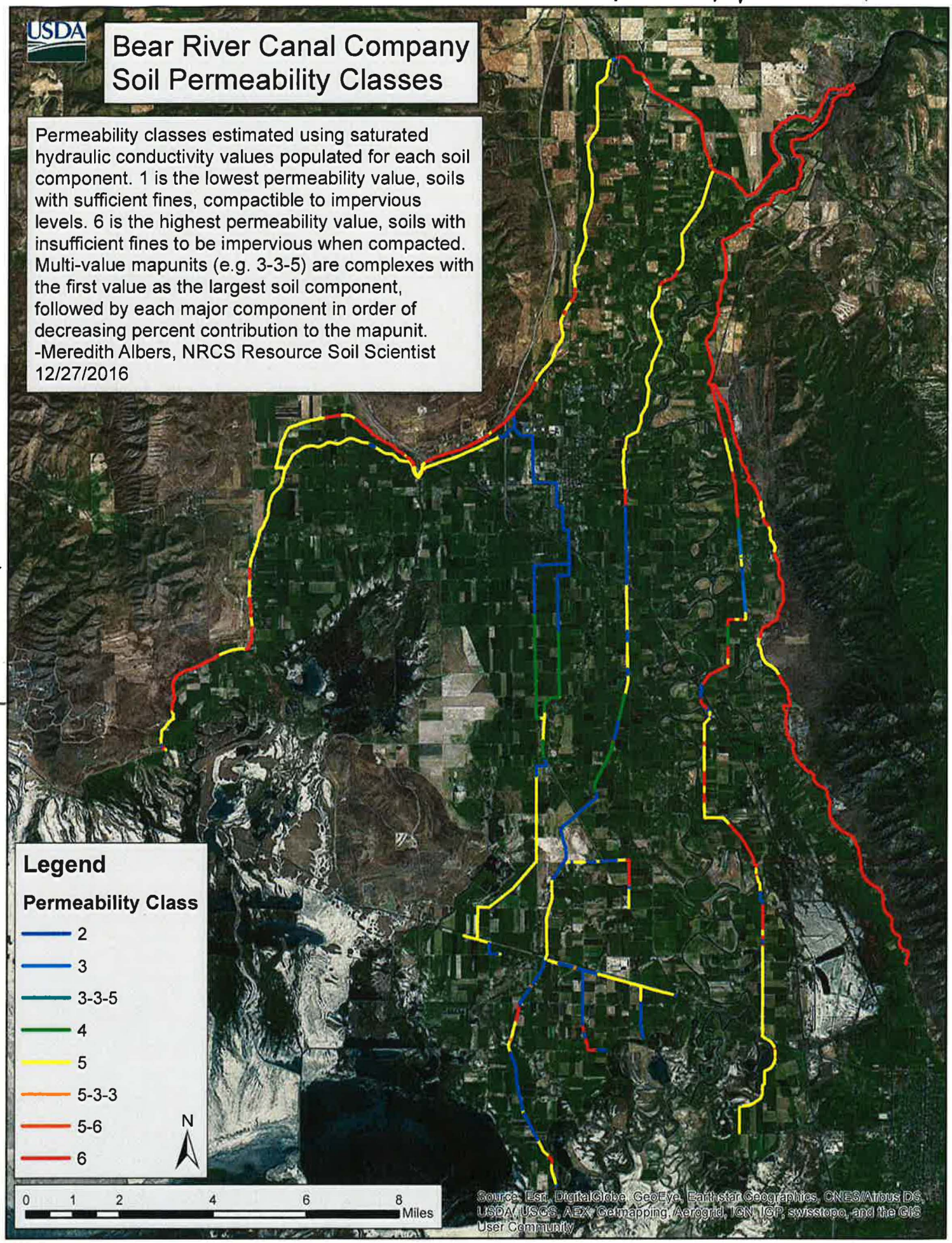
For an overall chemical limitation rating, 8 classes were assigned based on the combined limitations of each salt property. More properties with limitations increase the overall limitation class.

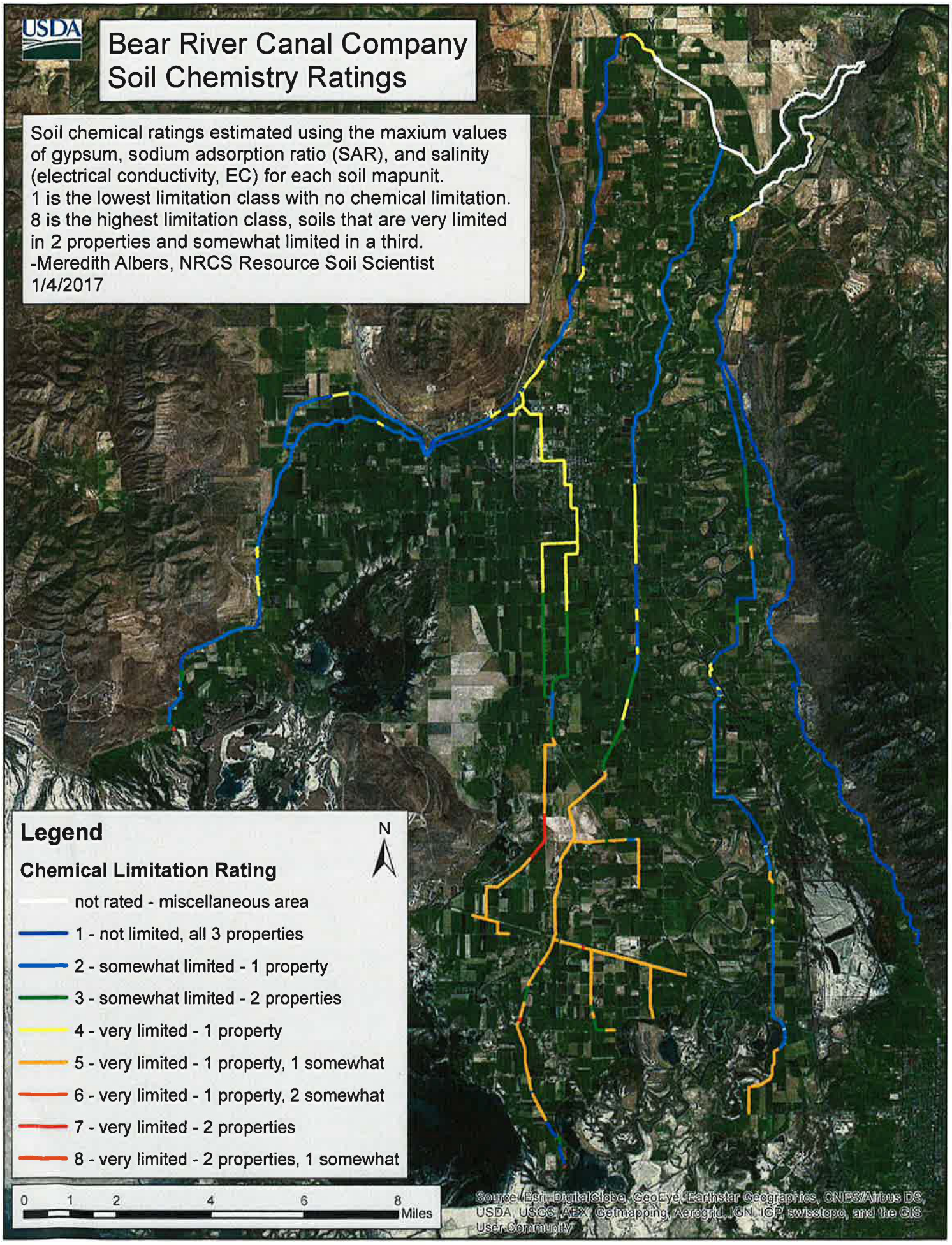
Table 4. Overall Limitation Classes assigned based on the number of soil properties limiting land use as an irrigation canal system.

Not Limited	Somewhat Limited	Very Limited	Overall Limitation Class
All 3 properties	0	0	1 - Not Limited
2 properties	1	0	2 - Somewhat limited
1 property	2	0	3 - Somewhat limited
2 properties	0	1	4 - Very Limited
1 property	1	1	5 - Very Limited
0 property	2	1	6 - Very Limited
1 property	0	2	7 - Very Limited
0 properties	1	2	8 - Very Limited

***Note on following maps:** The maps were created by clipping the official soil maps to the line shapefile provided by the Bear River Canal Company. The soil analysis is only on the mapunits that intersect the canals. Different soils mapped nearby may influence the canals but are not considered in this report.

Natural Resources Conservation Service
125 South State St., Room 4010, Salt Lake City, UT 84138
Voice 801 524-4550 Fax 1-844-715-4928


USDA
Bear River Canal Company
Soil Permeability Classes
Permeability classes estimated using saturated hydraulic conductivity values populated for each soil component. 1 is the lowest permeability value, soils with sufficient fines, compactible to impervious levels. 6 is the highest permeability value, soils with insufficient fines to be impervious when compacted. Multi-value mapunits (e.g. 3-3-5) are complexes with the first value as the largest soil component, followed by each major component in order of decreasing percent contribution to the mapunit.
-Meredith Albers, NRCS Resource Soil Scientist
12/27/2016
Legend
Permeability Class
2
3
3-3-5
4
5
5-3-3
5-6
6
N
0 1 2 4 6 8
Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


USDA
Bear River Canal Company
Soil Chemistry Ratings
Soil chemical ratings estimated using the maxium values of gypsum, sodium adsorption ratio (SAR), and salinity (electrical conductivity, EC) for each soil mapunit.
1 is the lowest limitation class with no chemical limitation.
8 is the highest limitation class, soils that are very limited in 2 properties and somewhat limited in a third.
-Meredith Albers, NRCS Resource Soil Scientist
1/4/2017
Legend
N
Chemical Limitation Rating
not rated - miscellaneous area
1 - not limited, all 3 properties
2 - somewhat limited - 1 property
3 - somewhat limited - 2 properties
4 - very limited - 1 property
5 - very limited - 1 property, 1 somewhat
6 - very limited - 1 property, 2 somewhat
7 - very limited - 2 properties
8 - very limited - 2 properties, 1 somewhat
0 1 2 4 6 8 Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

The Bear River Water Conservancy District lists the conservation and protection of water and water rights as its first endeavor in its mission statement. Partnering with the Conservancy District will provide evidence of BRCC's desire to conserve water and will increase the odds of obtaining funding.

PacifiCorp owns and maintains a significant portion of the canal within the Main Canal Area. A partnership with PacifiCorp may be beneficial to both parties as it would decrease the required maintenance of the canal for PacifiCorp and decrease the risk of failure for BRCC.

3.8.2 Lining of the Hammond Main Canal near the Landis Pit from Sta. 383+00 to 435+00

3.8.2.1 Description

A recent study has show significant water loss due to seepage from the Hammond Main Canal near the Landis Pit. Roughly 170 cubic feet of water passes through the canal at Sta. 383+00. According to the study, about 15 cubic feet per second is lost from Sta. 383+00 to 435+00. Not only is this water no longer usable downstream, but also can cause issues with bank stability and interfere with local farming.

Lining the Canal with an EPDM liner will conserve the water lost to seepage and allow for flexibility for future canal improvements. The project can be seen in the image below.

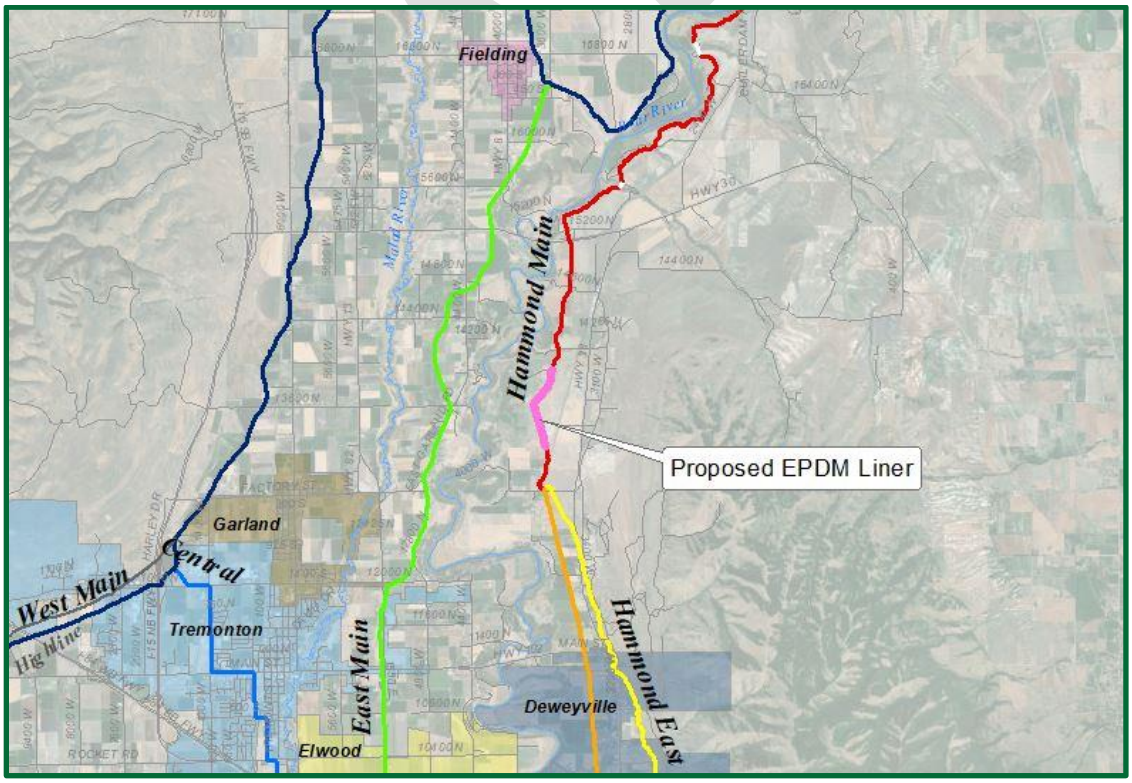


Figure 3-4. Landis Pit Lining Project

3.8.2.2 Funding

The funding for this project could come from a grant from the State of Utah, or a Water Smart Grant.

3.8.3 Headgate Automation and Drop Structure Telemetry

3.8.3.1 Description

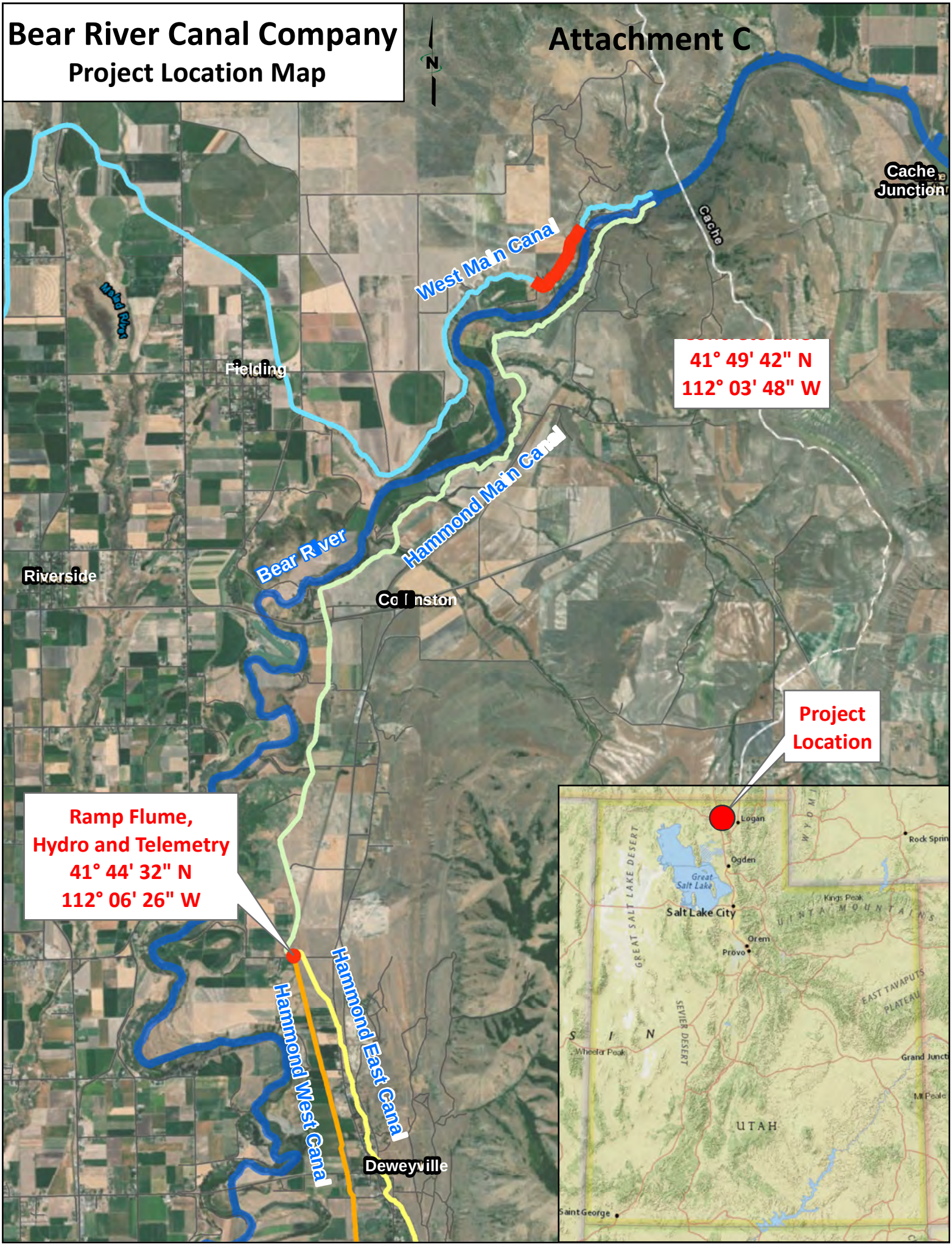
Install automatic headgates to major diversions. These include the heads of the Central, Iowa String, Lateral B, Lateral D, Lateral F, Hammond West, and the East Main canals. Install telemetry to approximately ten significant drop structures.

The installation of automatic headgates at the major divisions also scored high in the project evaluation process. The benefits of automation generally lie in a more efficient use of water. Like lining a canal, automated headgates can save water already available to the canal company to be used in a more beneficial manner all while providing remote water measurement and control.

The current manual headgate system necessitates a water manager to travel back and forth to each site, manually adjust each headgate, and attempt to balance the available flow to each turnout. The delay and inaccuracies inherent in this system introduce massive inefficiencies. The ability to program headgates to automatically pass a certain amount of water depending on the water available, allow for instantaneous communication between headgates, and to remotely control the headgates will drastically reduce these inefficiencies.

Bear River Canal Company
Project Location Map

Attachment C



Bear River Canal Company

BRCC Alignment

- West Main
- Central
- East Main
- Hammond Main
- Hammond West
- Hammond East
- IowaStringCanal
- Lateral A
- Lateral B
- Lateral D
- Lateral F

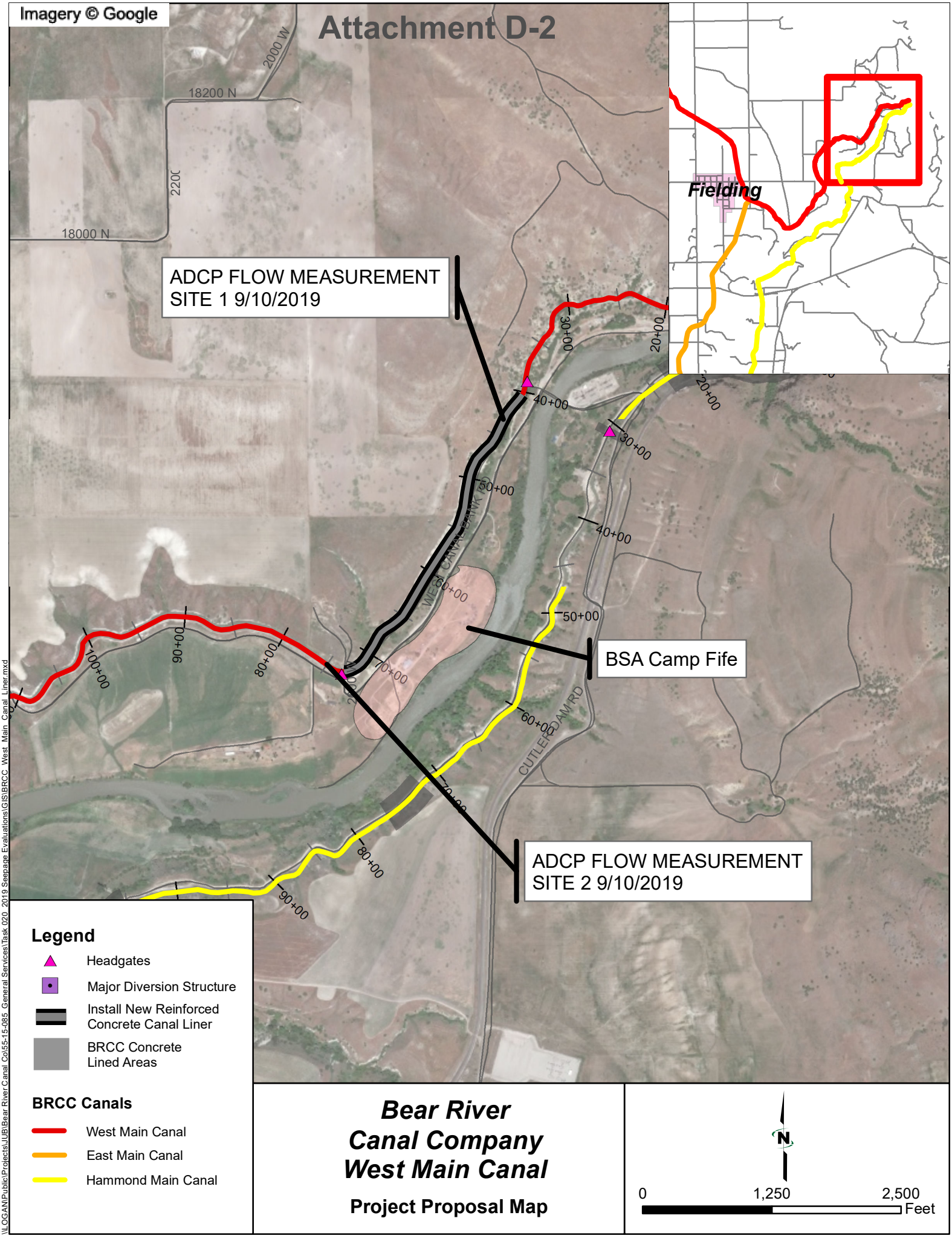
N W E S

0 5,000 10,000 20,000 Feet

Bear River Canal Company
Project Detail Map

Attachment D


Imagery © Google
Bear River Canal Company
Project Detail Map
N
Hammond Main Canal
12800 North
Ramp Flume,
Hydro and Telemetry
Hammond West Canal
Hammond East Canal



\\LOGAN\Public\Projects\UB\Bear River Canal Co\55-15-085 General Services\Task 020 2019 Seepage Evaluations\GIS\BRCC West Main Canal Liner.mxd

Station Number:
Station Name: West main camp fife

Attachment E

Meas. No: 0
Date: 09/10/2019

Party:
Boat/Motor:
Gage Height: 0.00 ft

Width: 50.7 ft
Area: 241 ft²
G.H.Change: 0.000 ft

Processed by:
Mean Velocity: -2.64 ft/s
Discharge: -636 ft³/s

Area Method: Avg. Course
Nav. Method: Bottom Track
MagVar Method: None (0.0°)
Depth: Composite (BT)
Discharge Method: Proportional
% Correction: 0.00

ADCP Depth: 0.199 ft
Shore Ens.:10
Bottom Est: Power (0.1667)
Top Est: Power (0.1667)

Index Vel.: 0.00 ft/s
Adj.Mean Vel: 0.00 ft/s
Rated Area: 0.000 ft²
Control1: Unspecified
Control2: Unspecified
Control3: Unspecified

Rating No.: 1
Qm Rating: U
Diff.: 0.000%

Screening Thresholds:
BT 3-Beam Solution: YES
WT 3-Beam Solution: YES
BT Error Vel.: 0.33 ft/s
WT Error Vel.: 0.98 ft/s
BT Up Vel.: 1.00 ft/s
WT Up Vel.: 4.00 ft/s
Use Weighted Mean Depth: YES

Max. Vel.: 4.85 ft/s
Max. Depth: 6.38 ft
Mean Depth: 4.77 ft
% Meas.: 74.59
Water Temp.: 70.0 °F
ADCP Temp.: 66.9 °F

ADCP:
Type/Freq.: StreamPro / 2000 kHz
Serial #: 1986
Firmware: 31.16
Bin Size: 9 cm
Blank: 50 cm
BT Mode: 0
BT Pings: 1
WT Mode: 12
WT Pings: 6

Performed Diag. Test: YES
Performed Moving Bed Test: YES
Performed Compass Calibration: NO Evaluation: NO
Meas. Location:

Project Name: west main camp fife_0.mmt
Software: 2.20

Tr.#		Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel.		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
000	R	2	3	121	-77.9	-478	-84.0	-0.318	-4.45	-645	51	244	10:16	10:18	0.36	-2.64	1	0
001	L	2	3	99	-74.3	-457	-75.9	-0.494	-4.27	-612	49	230	10:19	10:21	0.40	-2.65	0	0
002	R	2	3	97	-75.9	-464	-81.7	-0.777	-4.06	-627	51	243	10:22	10:24	0.42	-2.58	0	0
003	L	2	3	96	-76.0	-480	-76.4	-0.494	-4.45	-637	50	240	10:25	10:27	0.43	-2.65	0	0
004	R	2	3	97	-79.4	-484	-84.3	-0.706	-3.71	-652	52	248	10:28	10:30	0.44	-2.63	0	0
005	L	2	3	90	-78.1	-484	-77.3	-0.318	-4.70	-645	51	243	10:30	10:32	0.46	-2.65	0	0
Mean		2	3	100	-76.9	-475	-79.9	-0.518	-4.27	-636	51	241	**Total**	00:16	0.42	-2.64	0	0
SDev		0	0	11	1.84	11.2	3.87	0.192	0.348	14.7	1.2	5.9			0.04	0.03		
SD/M		0.0%	0.0%	10.7%	2.4%	2.4%	4.8%	37.0%	8.1%	2.3%	2.4%	2.5%			8.7%	1.1%		

Remarks:

Station Number: Meas. No: 0

Station Name: Site 1 good Date: 09/10/2019

Party:	Width: 35.6 ft	Processed by:
Boat/Motor:	Area: 157 ft²	Mean Velocity: -4.18 ft/s
Gage Height: 0.00 ft	G.H.Change: 0.000 ft	Discharge: -655 ft³/s

Area Method: Avg. Course	ADCP Depth: 0.199 ft	Index Vel.: 0.00 ft/s	Rating No.: 1
Nav. Method: Bottom Track	Shore Ens.:10	Adj.Mean Vel: 0.00 ft/s	Qm Rating: U
MagVar Method: None (0.0°)	Bottom Est: Power (0.1667)	Rated Area: 0.000 ft²	Diff.: 0.000%
Depth: Composite (BT)	Top Est: Power (0.1667)	Control1: Unspecified	
Discharge Method: Proportional		Control2: Unspecified	
% Correction: 0.00		Control3: Unspecified	

Screening Thresholds:

BT 3-Beam Solution: YES	Max. Vel.: 7.04 ft/s	ADCP:
WT 3-Beam Solution: YES	Max. Depth: 6.14 ft	Type/Freq.: StreamPro / 2000 kHz
BT Error Vel.: 0.33 ft/s	Mean Depth: 4.40 ft	Serial #: 1986 Firmware: 31.16
WT Error Vel.: 0.98 ft/s	% Meas.: 73.36	Bin Size: 8 cm Blank: 50 cm
BT Up Vel.: 1.00 ft/s	Water Temp.: 70.0 °F	BT Mode: 0 BT Pings: 1
WT Up Vel.: 5.00 ft/s	ADCP Temp.: 66.4 °F	WT Mode: 12 WT Pings: 6
Use Weighted Mean Depth: YES		

Performed Diag. Test: NO Project Name: Good Site 1_0.mmt

Performed Moving Bed Test: YES Software: 2.20

Performed Compass Calibration: NO Evaluation: NO

Meas. Location:

Tr.#		Edge Distance		#Ens.	Discharge						Width	Area	Time		Mean Vel.		% Bad	
		L	R		Top	Middle	Bottom	Left	Right	Total			Start	End	Boat	Water	Ens.	Bins
001	R	4	3	105	-68.4	-478	-88.9	-4.34	-4.73	-644	36	156	08:50	08:52	0.35	-4.14	3	6
003	L	4	3	83	-70.7	-489	-104	-4.87	-4.34	-673	36	160	08:55	08:56	0.44	-4.22	2	8
004	R	4	3	74	-69.2	-496	-95.3	-16.9	-4.48	-682	35	164	08:57	08:58	0.45	-4.16	4	5
005	L	4	3	96	-66.5	-464	-89.5	-4.45	-10.5	-635	35	151	08:59	09:01	0.42	-4.20	1	5
006	R	4	3	86	-68.4	-477	-92.2	-5.37	-4.41	-647	36	157	09:02	09:03	0.39	-4.11	1	5
007	L	4	3	80	-68.0	-480	-93.4	-4.59	-4.20	-651	35	154	09:04	09:05	0.46	-4.23	3	6
Mean		4	3	87	-68.5	-481	-93.8	-6.75	-5.44	-655	36	157	**Total**	00:15	0.42	-4.18	2	6
SDev		0	0	11	1.40	11.2	5.33	4.98	2.46	18.3	0.6	4.5			0.04	0.05		
SD/M		0.0%	0.0%	13.0%	2.0%	2.3%	5.7%	73.7%	45.3%	2.8%	1.7%	2.9%			9.3%	1.1%		

Remarks:

Table 3-1 Prioritized Areas of Concern and Proposed Actions

PRIORITIZED AREAS OF SAFETY CONCERN & PROPOSED ACTIONS							
PRIORITY	CANAL BRANCH	APPROXIMATE STATION		LOCATION DESCRIPTION	RISK CLASS-IFICATION	PAST SLOPE INSTABILITY SIGNS	PROPOSED ACTION
		START	END				
1	Hammond East	106+00	112+00	Above a home near the intersection of HWY 102 and HWY 38	Very High	Yes	Install concrete trapezoidal liner or HDPE pipe in canal. Pipe spring near the canal away from homes.
2	West Main	50+00	70+50	Above Camp Fife	Very High	Yes	Monitor for signs of slope instability utilizing the Slope Stability and Land Use Inspection Sheet in Appendix D. If signs increase, install concrete trapezoidal liner or HDPE pipe in canal.
3	Hammond East	325+00	335+00	Just North of Crystal Hot Springs, next to farm.	Very High	Yes	Monitor for signs of slope instability utilizing the Slope Stability and Land Use Inspection Sheet in Appendix D. If signs increase, install concrete trapezoidal liner or HDPE pipe in canal.
4	Hammond East	430+00	440+00	In Honeyville next to home. Near crossing of 7200 North Street	Very High	Yes	Monitor for signs of slope instability utilizing the Slope Stability and Land Use Inspection Sheet in Appendix D. If signs increase, install concrete trapezoidal liner or HDPE pipe in canal.
5	Hammond Main	405+00	420+00	Upstream of head Gate HM46	Low	Yes	Line canal with clay and monitor. Install pipe or concrete liner if seeps continue
6	East Main	50+00	65+00	Upstream of head gate 8E In Hillside above Bear River	Low	Yes	Monitor for signs of slope instability utilizing the Slope Stability and Land Use Inspection Sheet in Appendix D.

3.4.1 Improvement Summary

Priority #1 on the Hammond East Canal near the canal crossing with Highway 38 should be lined with concrete or piped as soon as possible. Priority 5 is currently being addressed this winter by installing clay along the canal and should be monitored during the upcoming irrigation season. Continued effort may be needed to identify exactly where water is seeping out of the canal in this area.

The other four priorities should be monitored very closely this upcoming irrigation season. If any signs of slope instability are seen, these priority areas should be addressed.

3.4.2 Hammond East Canal Improvements

The Hammond East canal is a canal with many potential risks. This is due to the fact that it is located on steep hill sides for most of its length and it has many homes and a highway located below it. This canal does not carry as much water as most of the other BRCC canals which make it more feasible to line with concrete or to enclose in a pipe. BRCC should begin to evaluate and quantify water losses along this canal and pursue funding in order to fund improvements to this canal.

3.4.3 Opinions of Probable Cost for Improvements

Some very conceptual opinions of probable cost are provided below to help BRCC in planning for the funding of future improvement projects. These costs are not site specific and there are many variables that could affect (raise or lower) the actual costs. The actual costs will need to be estimated more accurately during design of the improvements.

Most of the Hammond East Canal has been classified as high or very high risk with section of the canal that is the top risk priority (Priority #1). Opinions of probable costs have been prepared to line or pipe the canal based on lining or piping a canal with a flow capacity of 65 cfs.

The approximate cost to design and construct a concrete liner for the Hammond East Canal is $350 per lineal foot of canal. The approximate cost to pipe the Hammond East Canal is $425 per lineal foot of canal. Table 3-2 provides the total estimates to line or to pipe the Hammond East canal in its entirety. A phased approach to improving this canal may be needed over a long period of time.

Attachment G

BOY SCOUTS OF AMERICA®
TRAPPER TRAILS COUNCIL

September 10, 2019

Trevor Nielson
Bear River Canal Company
275 N 1600 E
Tremonton, UT 84337

Mr. Nielson,

Trapper Trails Council 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 increase the efficiency of your system and to safeguard valuable water resources – especially in proximity to Camp Fife, our property below the west canal.

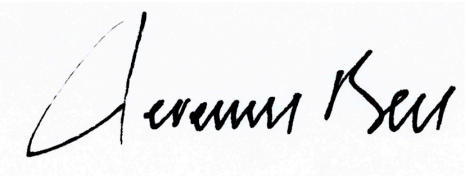
Camp Fife is one of eight properties operated by Trapper Trails Council. Safety and a positive outdoor experience are top priority whilst serving the over 6,000 participants that attended Camp Fife in 2019.

In 2017, canal leaks were visible above Camp Fife. In the interest of participant safety, groups that were registered to attend Camp Fife were sent to a day camp outside of Huntsville, UT.

Installation of canal liners, as a result of these funds, are in the best interest of those dwelling below the canals operated by the Bear River Canal Company.

Thank you for your consideration in this matter. If I can be of any further assistance, please do not hesitate to contact me.

Sincerely,



Jeremy Bell
Camping Director

1200 East 5400 South
Ogden, UT 84403
Office 801.479.5460
Fax 801.475.0197
www.trappertrails.org

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PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

1407 West North Temple, Suite 110, Salt Lake City, Utah 84116

September 24, 2019

To: U.S. Bureau of Reclamation
Re: WaterSMART Water and Energy Efficiency Grant Application

Dear Reclamation,

PacifiCorp is a public utility based in Salt Lake City and serves nearly 1.1 million customers in Utah, Idaho and Wyoming. PacifiCorp owns storage water rights in Bear Lake and has contractual obligations to deliver water from Bear Lake to irrigators in Idaho and Utah, specifically the Bear River Canal Company who receives their water from Cutler Reservoir.

The Bear River Canal Company is seeking to line a 3900 linear foot section of the West Main Canal in an effort to conserve and use water more efficiently. PacifiCorp recognizes the importance of protecting this valuable resource and is writing in support of the proposed application submitted by the Bear River Canal Company to the U.S. Bureau of Reclamation Water and Energy Efficiency Grants Program.

This is an important project and PacifiCorp encourages Reclamation to provide funding under the grant program.

Sincerely,

Devin Pharis
PacifiCorp - Director, Hydro East

CHESAPEAKE DUCK CLUB

1015 SOUTH 6800 WEST
CORINNE, UTAH 84307

September 20, 2019

Trevor Neilson,
General Manager
Bear River Canal Company
275 North 1600 East
Tremonton, UT 84337

Dear Trevor,

As the end user of the East canal, the Chesapeake Duck Club is vitally interested in anything that will increase the efficiency of the canals. As you know, we are often shorted on our allotted distribution, especially in the early part of the irrigation season, due to lack of available water and/or an inefficient delivery system.

I understand that you are pursuing funds from the Bureau of Reclamation Water and Energy Efficiency Grants Program. The Club supports you in these efforts and hopes that through these funds the efficiency of the canal flows will be increased, such that all canal users, and particularly those, like us, at the end of a canal, will have a reliable flow of water throughout the entire irrigating season.

I appreciate your efforts to search for ways to preserve the limited water that we have in this area and anticipate that the contemplated projects will be beneficial to all of us.

If there is anything that we can do to assist you in this quest, please let me know.

Sincerely,

J. Thomas Bauer

President, Chesapeake Duck Cluib

J.Y. Ferry & Son, Inc.

September 20, 2019

Trevor Neilson, General Manager
Bear River Canal Company
275 North 1600 East
Tremonton, Utah 84337

Dear Mr. Neilson,

J. Y. Ferry & Son, Inc. is pleased to write in support of your grant application being submitted to the Bureau of Reclamation Water and Energy Efficiency Grants Program. We appreciate your efforts to increase the efficiency of your system to safeguard valuable water and energy. We have been implementing water efficiency projects over the past 15 years on our farm and ranch including the piping of earthen ditches, laser leveling fields and installing efficient irrigation systems.

J. Y. Ferry & Son, Inc. recognizes the importance of water preservation in our often water-short basin. The water saved through these improvement projects will provide benefit to water users and the regional environment. We have used Bear River Canal water for the past 117 years to manage farm and grazing lands in the Bear River Valley. We also use the Canal water to manage and maintain five duck clubs on several thousand acres of wetlands. We recognize the importance the canal water plays in maintaining these wetlands. We encourage the conservation and efficient use of water in the Bear River Canal system to help protect this valuable resource.

We strongly support your grant application and appreciate the advancements it will make in improving efficiency for Bear River Canal Company.

Sincerely,

Joel M. Ferry
Treasurer
J.Y. Ferry & Son, Inc.

United States Department of the Interior
FISH & WILDLIFE SERVICE

Bear River Migratory Bird Refuge Complex
2155 West Forest Street
Brigham City, Utah 84302
(435) 723-5887

September 30, 2019

Trevor Nielson, General Manager
Bear River Canal Company
275 N 1600 E
Tremonton, UT 84337

Dear Mr. Nielson,

The Bear River Migratory Bird Refuge, U.S. Fish and Wildlife Service, 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 increase the efficiency of your system to safeguard valuable water and energy. These water resources are critical for supporting wildlife resources.

The U.S. Fish and Wildlife Service recognizes the importance of water preservation in our often water-short basin. The water saved through these improvement projects will provide benefit to water users and the regional environment. We have worked with the Bear River Canal Company closely to identify opportunities to work as partners for water conservation that untimely returns water to the refuge and the Great Salt Lake ecosystem.

We strongly support your grant application and appreciate the advancements it will make in improving efficiency for Bear River Canal Company.

Sincerely,

Erin Holmes
Project Leader
Bear River Migratory Bird Refuge