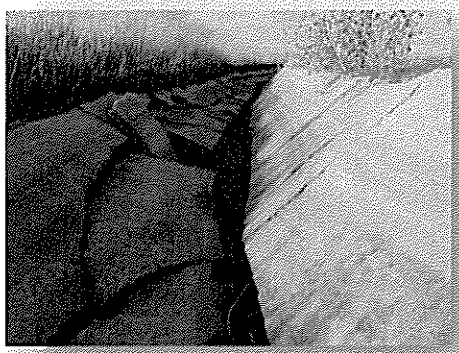

Newton Water Users Association
CANAL PIPING PROJECT

WaterSMART: Water and Energy Efficiency Grants for FY2015 No. R15AS00002

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Table of Contents

Table of Figures

Tables

Technical Proposal: Executive Summary

Date: January 21, 2015
Applicant: Newton Water Users Association
Address: P.O. Box 81
City: Newton **County:** Cache **State:** Utah
Contact: Scott Archibald Sunrise Engineering sarchibald@sunrise-eng.com or Val Jay Rigby, President Newton Water Users Association 435.563.9293 rigbyranch@comcast.net

Technical Proposal: Project Summary

The main purpose of this project is to enable the Newton Water Users Association (NWUA or Association) to conserve and more efficiently manage the available water in Newton Reservoir. The significant benefits to this project are as follows:

- Provide pressurized water to the majority of the shareholders.
- Eliminate 1,980 ac-ft. (36%) of water loss due to evaporation, seepage, and over-runs by piping the earth and dilapidated concrete lined canal system.
- Better manage 5,500 ac-ft. (100%) of the delivered water.
- Conserve energy by using the available head pressure created by piping the canal to Newton Reservoir. This will reduce the power demands of the 13 pumps by an average of 2,480 kW-hr per day (33%).
- Reduce costs required to operate and maintain the system by eliminating the need to burn the canal banks, de-moss the water, and drive the canal twice a day to manage the rationing of the water usage between shareholders.

This project is currently under design. The following items are near completion: the requirements under the National Environmental Policy Act (NEPA); the archeological study; the 404 steam alteration permit from the Army Corp of Engineers; the pipeline design work; and the easements. Monthly meetings have been conducted with the BOR for the past year in preparation of constructing this project. The Association has secured a $3.06M dollar loan at 2.0% interest from Utah Division of Water Resources and pledged $0.2M of their savings towards the project. Due to the fact that the project interacts with Federal facilities, Newton Dam & Reservoir, the Bureau of Reclamation (BOR or Reclamation) is required to complete the design and construction oversight of the pipeline thru the dam. Scott Winterton, a Chief Design Group employee at the Provo Area Office, is BOR's main contact with the Association. The Association is seeking $300,000 from Reclamation through this program. The total project cost is estimated to cost $3.56M. The anticipated project length is 18 months to be completed in May of 2017.

Design and construction of the project is anticipated to occur over a period of two years. During the first year the environmental review, easements, design of the pipeline, and the construction of the pipeline to the dam will be completed. In addition, the BOR will

complete the design through the dam. During the second year the project will be finalized by completing the portion of the pipeline through the dam making a fully operational system. It is estimated that the project will be completed by May of 2017.

Technical Proposal: Background Data

The project is located 0.5 to 2 miles north of the Town of Newton, Utah (see Figure 1). In 1941, the Bureau of Reclamation (BOR) teamed with the NWUA and completed the construction of the Newton project in 1948. The Newton project has been a great resource to the Association and to the community. The dam, reservoir, and canals were constructed to replace the original structure constructed in 1874. The dam, reservoir, and canal system is known to BOR as the Newton Project and is identified as Project #292. Additional information concerning the dam, reservoir, and canal history can be reviewed on the BOR website (http://www.usbr.gov/projects/).

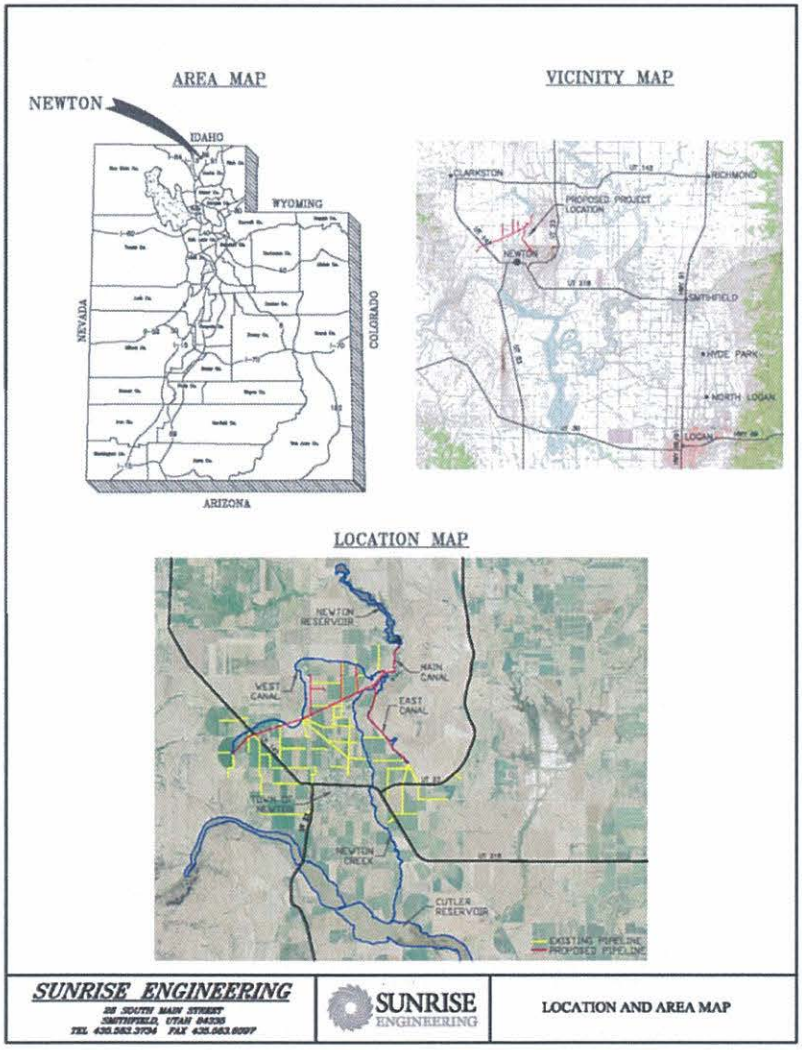


Figure 1 - Project Location

Source of Water
Clarkston Creek provides source water for Newton Reservoir. Water from the reservoir is conveyed into the canal system through an intake structure located in the dam.

Water Rights
The water rights involved in this project are listed under supplemental group number 628291, or water right numbers 25-3082, 25-3515, and 25-6870. These water rights have an agricultural beneficial use designation. A summary of NWUA's water rights are below.

WR#	Priority	Irrigated Acre	Ac-Ft
25-3515	1869	1,363.62	5,454.48
25-3082	1938	1,066.06	4,264.24
25-6870	1987	1,108.60	4,434.4
	Totals:	3,657.77	14,153.12

Water Shortfalls
Depending on the snowpack and annual precipitation, NWUA has the right to more water and could use more than typically reaches the reservoir. NWUA must conservatively allocate and monitor the amount of water to each user on the system in order to provide water for the 150 day growing season.

The agricultural lands are irrigated by sprinkling which allows for harvests of alfalfa, corn, and a variety of grain crops. A large portion of this harvested agricultural land supports local dairy operations. Water conserved by piping the canals will help the farms provide adequate water supplies to crops during the entire growing season, thus producing a higher quality of crops.

Water Users and Number of Users Served
The Association is made up of 202 shareholders who hold 4,640 shares of water. Additionally, the Newton Fire Department accesses irrigation lines as needed.

Water Delivery System
The canal delivery system is made up of both earth and concrete lined canal segments. The system consists of the following features:

- Control gate and piping through Newton Dam
- 0.6 miles of Main concrete canal
- 2.0 miles of East concrete & earthen canal
- 4.0 miles of West concrete & earthen canal
- 2 siphons
- 6 small individual reservoirs for pumping
- 4 cutthroat flumes and 1 parshall flume
- 34 individual connections

In addition to the portion of the system operated by the Association, the shareholders operate and maintain the following irrigation features at their own expense.

- 13 individual electrical pump stations
- 2 individual propane pump stations
- Over 20 piped lateral lines totaling approximately 21 miles
- Numerous pivot, wheel, and hand sprinkler lines

Energy Efficiency
As mentioned above, there are 13 individual electrical pump stations and two individual propane pump stations located along the main canals. Optimum operation of pivot and wheel sprinkler irrigation system suggests that users maintain pressures of 45-50 psi. Electric motors operating pumps maintain this pressure to the sprinklers. Piping the canals will provide additional head pressure to pumps, thus reducing the booster pump pressure required to maintain 45-50 psi. Elevation data indicates that there will be 45 to 115 feet of head available (15-50 psi) from the piped system depending on where the pump is located in relationship to the dam. It was calculated that 33% energy savings can be realized for the electrical pump stations with the minimum available pressure from the height at the reservoir of 15 psi. These savings come through reduced horsepower requirements.

Past Relationship with Reclamation
Since 1941 NWUA has worked with Reclamation on the construction of the Newton reservoir, dam, and canal system. The completion of that project has benefited the members of the Association for 74 years.

Technical Proposal: Technical Project Description

Irrigation water is currently conveyed through an open channel outlet structure that was built through Newton Dam into the reservoir. BOR's design team in Denver and Provo will be designing the new pipeline through the dam. After the pipe is through the dam, NWUA design team will continue the design of the pipeline, service meters, and connections. Currently, the BOR operates a solar SCADA measurement device on the parshall flume immediately below the dam. This device automatically transmits readings to the BOR. New flow meters will be upgraded as part of the project.

In general, the pipeline will follow the existing canal alignment in the Main and East canal. Along the West canal a shorter alignment has been chosen with smaller diameter lateral lines branching off to service users. The main pipeline section is 4,700 feet long and crosses a small ravine where the first siphon is currently located. This section will need to be able to deliver approximately 79 cfs of water. At this point, the canal system forks into the East and West segments.

The East pipeline segment will be approximately 2.0 miles long and immediately crosses Clarkston Creek where the second siphon is currently located. The East

pipeline segment will be sized to pass approximately 22 cfs. Appropriate valves and drains will be located in the siphon areas to ensure draining of the pipe to prevent freezing.

The West segment is approximately 2.5 miles in length and will need to carry approximately 58 cfs. Four smaller lateral pipelines will also be installed along this segment in order to convey water to users. The total length of the laterals is 2.1 feet long. Along the East and West segments, there will be valves and meters at each of the 34 service turnouts. The meters will be used to monitor water usage provide tools for management of the water. It is anticipated that HDPE pipe will be used for the pipeline. Pipe sizes will range from 6" to 48" in diameter. In all, approximately 6.6 miles of pipelines (laterals and main lines) will be installed to replace the canals.

Technical Proposal: Evaluation Criteria

Eval Criterion A: Water Conservation

Subcriterion A.1: Quantifiable Water Savings

A.1.(1) *Canal/Lining Piping*

The annual water consumption used by the NWUA is entirely dependent on the amount of run-off storage available each year within Newton Reservoir. According to BOR records, the annual discharge ranges between 3,815-8,570 acre-feet, with an average of approximately 5,500 acre-feet. Throughout the canal system, NWUA operates a number of cutthroat flumes and a parshall flume.

Inflow/Outflow test were conducted during the months of July through September, 2011. The NWUA's water master recorded eight readings of water depths in each flume throughout the system and determined use between each flume. The water master also measured the flow depth at the weir just below the dam each day. He used a rating table provided by the BOR to determine the flow leaving the dam. Table 1 outlines the data gathered during the summer of 2011 and Table 2 outlines data gathered in 2014.

Table 1: Irrigation Flows (cfs) - 2011							
Date	**Dam Flow**	**East Pond Flume**	**West Ditch Flume**	**Flow Out East**	**Flow Out West**	**Flow Lost**	**% Flow Lost**
21-Jul	21.00	3.48	1.86	2.51	10.03	3.13	15%
3-Aug	4.00	1.16	0.77	0.00	0.00	2.07	52%
10-Aug	18.50	1.16	2.30	0.67	5.35	9.02	49%
18-Aug	27.50	2.77	3.07	3.68	12.03	5.96	22%
24-Aug	32.50	3.80	3.37	3.34	11.36	10.62	33%
31-Aug	29.00	6.20	4.45	0.67	13.03	4.65	16%
7-Sep	14.00	2.12	1.54	0.00	3.34	7.00	50%
13-Sep	10.00	0.89	2.53	0.50	1.00	5.07	51%
		Average Flow Lost				**5.94**	**cfs**
		Average Incoming Flow Through Ditch				**19.56**	**cfs**
		Average Percentage of Flow Lost					**36%**
		High Percentage of Flow Lost					**52%**
		Low Percentage of Flow Lost					**15%**

Note: (See Appendix C for Flume equations)

Table 2: Irrigation Flows (cfs) - 2014					
Date	**Dam Flow**	**Ditch Flow**	**Flow Lost**	**% Flow Lost**	
2-Jun	20	11.5	8.5	42.5%	
17-Jun	34	26	8	23.5%	
4-Jul	27	21	6	22.2%	
16-Aug	16	10	6	37.5%	
		Average Flow Lost		**7.125**	**cfs**
		Average Incoming Flow Through Ditch		**24.25**	**cfs**
		Average Percentage of Flow Lost			**31.43%**
		High Percentage of Flow Lost			**42.5%**
		Low Percentage of Flow Lost			**22.2%**

Over an average water year, the canal system loses approximately 1,980 acre-feet (5,500*0.36=1,980) due to seepage and evaporation.

It is anticipated that the pipeline will be constructed of HDPE pipe. The pipeline will range from 6" to 48" in diameter. From the data above, the anticipated average seepage and evaporation reduction over the 6.6 miles of existing canals is anticipated to be 300 acre-feet per mile (1,980 acre-feet / 6.6 miles = 300 acre-feet/mile).

Currently, water is lost mostly due to seepage through the portions of dirt lined canal and concrete canal that has lost its structural integrity, with some minor loss due to evaporation. It has always been noted by the local community that when water is diverted into the canals in the spring of the year, the flow in Clarkston Creek rises due to the seepage from the canal. When this project is constructed, the water conserved from the improvements will remain in Newton Reservoir.

As mentioned above, the discharge from Newton Reservoir ranges between 3,815-8,570 acre-feet, with an average discharge of 5,500 acre-feet. With the installation of the proposed improvements, 100% of the available water will be better managed.

$$Percentage\ of\ Water\ Better\ Managed = \frac{Estimated\ Amount\ of\ Water\ Better\ Managed}{Average\ Annual\ Water\ Supply}$$

$$100\ \% = \frac{5{,}500\ Acre\ Feet}{5{,}500\ Acre\ Feet}$$

With the frost free season lasting only 150 days, the irrigation season is nearly as short. As such, the 1,980 acre-feet of annual conservation is largely distributed over the course of 5 months, creating a monthly savings of 396 acre-feet.

$$\frac{5{,}500\ Acre\ Feet}{5\ Months\ per\ growing\ season} = 1{,}100\ Acre\ Feet\ per\ Month\ of\ Growing\ Season$$

The water users are losing 396 acre-feet per month of water through their open channel canals. Seepage is the main cause for the loss while evaporation and overflowing account for only minor losses. With the enclosure of the canals, this conserved water, on average totaling 5,500 acre-feet, will remain in Newton Reservoir and be more efficiently utilized between the users to irrigate their existing crops later into the growing season and by supplying water more effectively when the crops need it.

As previously noted piping the canal will increase the volume of water and pressure available throughout the delivery system, aiding in the efficiency of pressurized irrigation systems.

A.1.(2) *Municipal Metering*

N/A

A.1.(3) *Irrigation Flow Measurement*

As mentioned above the 1,980 acre-feet water savings were calculated by using inflow/outflow methods. Flume measurements were made at the beginning of the canal network and at the flumes located at the end of the West and East canals. While field measurements through flumes are not very accurate, it is the best method available at this time.

The project plans on installing 36 flow meters.. Accuracy of the meters is 98.5% ± 1.5. The meters will be located at the service laterals. The meters will provide very accurate accountability of the water consumed by each user. Upon completion of the project water savings will be verified by comparing actual readings with the water masters' records and determining the additional amount of water delivered. In addition, the responses from users will be gathered to determine how effective the piping system allowed users to apply water when the crops needed it versus availability.

A.1.(4) *SCADA and Automation*

Automation of the system will be greatly improved by piping the canal system. The water delivery system will be hydraulically automated, eliminating overflows and spills that historically occurred with the canal network. In the paragraphs above the 1,980 acre-feet of water savings was outlined. A SCADA metering system will be connected on the diversion immediately below the dam. This will assist BOR and NWUA in monitoring the flows being released from the reservoir into the piping network. Water savings will be compared with previous year's data.

A.1.(5) *Groundwater Recharge*

N/A

A.1.(6) *Landscape Irrigation Measures:*

N/A

A.1.(7) *High-Efficiency Indoor Appliances and Fixtures:*

N/A

A.1.(8) *Other Projects Types Not Listed above:*

N/A

Subcriterion A.2: **Percentage of Total Supply**

As indicated previously, total average water supply from Newton Reservoir is 5,500 acre-feet per year. Of this volume, approximately 1,980 acre-feet of water will be conserved each year with the proposed improvements through seepage, leakage, evaporation, and vegetation uptake reduction. The percentage of total water supply conserved is approximately 36%.

$$\frac{Estimated\ Amount\ of\ Water\ Conserved}{Average\ Annual\ Water\ Supply} = Percentage\ of\ Total\ Supply$$

$$\frac{1{,}980\ Acre-ft}{5{,}500\ Acre-ft} = 36\%$$

Eval Criterion B: Energy-Water Nexus

Subcriterion B.1: Implementing Renewable Energy Projects Related to Water Management Water Management and Delivery

The NWUA has performed a cursory feasibility investigation of installing hydropower units in the irrigation conveyance system. Net metering would be the most cost efficient option for tying the system into the electrical grid. However, since NWUA does not own the pumps on the system, it uses a negligible amount of power and the credit for electricity generated could not be applied to the majority of power used by the system. Other options for selling power back to the power company would be cost prohibitive. Due to the lack of benefit to the NWUA, no renewable energy projects will be pursued as part of the proposed project.

Subcriterion B.2: Increasing Energy Efficiency in Water Management

Current Pumping Requirements:
Currently, there are 13 electrical pump stations along the canal system that are operated approximately 100 days over the five month irrigation season. The users endeavor to maintain 45 to 50 psi in their irrigation pivots and wheel lines. According to site elevation data, when the canal is closed into a pipe there will be an average available pressure of 15 psi to the each users.

Users will reduce motor sizes or install variable frequency drives after the project is complete to reduce power usage. Initial calculations indicate that the 13 electrical pumps currently consume approximately 7,430 kW-hr per day when they are operating. With the proposed improvements, the daily power consumption will reduce to approximately 4,950 kW-hr per day. This results in a net power savings of 2,480 kW-hr per day, 248,000 kW-hr per year based on the 100 days of pumping per year. As a percentage the savings equals 33 percent (2,480 kW-hr/day / 7,430 kW-hr/day = 33%).

At $0.07 per kW-hr, the water users in the NWUA using electrical pump stations will save approximately $3,500 per month, or $17,300 per year. Over the 100-year life of the project, an energy savings of $1,700,000 could be realized, neglecting inflation and power cost increases.

Energy Required for Treating the Water:
There is no energy requirement proposed to clean or treat the water for this project.

Reduced Vehicle Miles Driven:
The project includes a solar-powered metering system which will reduce the time, fuel, energy, and money spent to have a person drive the ditch twice a day during the irrigation season. Thus a major savings in fuel consumption and CO2 pollutions will be realized by this project. Currently, a person drives 10 miles round trip twice a day. That is 140 miles per week. After the completion of the project it is anticipated that the water master will drive the pipeline twice a week. This will result in a savings of 120 miles per week. Each year in the spring the canal banks are burned. It takes 200 gallons of diesel fuel, 100 man hours of labor, 10 hours of a tractor, fire truck, and brush truck each to

complete this task. Additionally, the Association spends $7,200 per year applying moss killing chemicals to the water. By piping the ditch there are several savings that will happen as a result. These savings are calculated as follows:

Fuel Savings: 120 miles per week/ 140 miles per week = 86% fuel savings
Pollution Savings: A similar 86% reduction in CO2 emissions will be realized.
Maintenance Savings: 200 gallons of diesel, 100 man hours, 10 hours of tractor, fire truck, and brush truck time to burn ditches and $7,200 in chemical savings from de-mossing the canals. The Association invests an estimated $23,000 annually to the maintenance and repair of the deteriorating canals. The shareholders agree that this costly effort is only to increase in perpetuity if no permanent solution is reached. The shareholders support the effort to partner with the Bureau of Reclamation in order to address their desires to better manage and more effectively use the water that is available.

Eval Criterion C: Benefits to Endangered Species

In 2009, the Utah Division of Wildlife Resources created the "Utah Comprehensive Wildlife Conservation Strategy – Species of Greatest Conservation Need." This document took a three-tiered approach to classify species in order of greatest conservation need. Tier I includes federally listed threatened, endangered, federal candidate, and conservation agreement species. Tier II includes species of special concern to the state of Utah.

Cache County has four Tier I federally listed species and two candidate species. A cursory analysis of the species and their habitat indicates that no federally listed or candidate species are likely to be found due to insufficient or lack of critical habitat in the area below Newton Reservoir. It is also not likely that sufficient habitat could be created to attract any of the Tier I species in Cache County. However, there are four Tier II state species of concern that exist that can be positively affected by this project. The four Tier II species and proposed efforts to provide suitable habitat with this project are listed in Table 3.

Table 3: Tier II Species

Tier II Species	***Preferred Habitat***	***Recommended Habitat Project/Mitigation***	***Water supply***	***Site Availability***	***Mitigation Effort***
Bobolink *Dolichonyx oryzivorus*	Grassy, wet meadow habitat. Nest in taller grasses. Common in Cache Valley	Identify and set aside area where wet meadow grass habitat is found and or can be created is found and designate area as habitat. Mow grass every other year in late fall.	Needed to keep area/soils and grass habitat moist.	Suitable sites exist to create habitat. Mitigation measures will identify and manage sites for species.	Mitigation efforts to include habitat management and monitoring.
Grasshopper Sparrow *Ammodramu*	Uplands and grassy areas. Common in Cache Valley.	Identify and set aside area where wet meadow grass habitat is found and or can be	Not really needed	Suitable sites exist to create habitat. Mitigation	Mitigation efforts to include habitat management and monitoring.

Table 3: Tier II Species					
Tier II Species	***Preferred Habitat***	***Recommended Habitat Project/Mitigation***	***Water supply***	***Site Availability***	***Mitigation Effort***
s savannarum	Similar habitat as Bobolink.	created is found and designate area as habitat. Mow grass every other year in late fall.		measures will identify and manage sites for species.	
Sharp-tailed grouse *Tympanuchus phasianellus*	Preferred habitat is Bunch-grass interspersed with deciduous shrubs. Grouse are ground nesters and raise only one brood per year, and are susceptible to predation and population decline.	Identify and set aside/plant grassy areas where grass forb mixes can be planted. Look for areas to plant berry baring plants such as plumb, choke cherry, sumac etc. Address predation issues with skunks, raccoons etc.	Needed to keep berry bearing shrubs and trees productive and growing.	Suitable sites exist to create habitat. Mitigation measures will identify and manage sites for species.	Mitigation efforts to include habitat management and monitoring.
Short-eared owl *Asio flammeus*	The Short-eared Owl is an open country, ground nesting species that occupies grasslands	Identify and set aside/plant grassy areas.	Not really needed.	Suitable sites exist to create habitat. Mitigation measures will identify and manage sites for species.	Mitigation efforts to include habitat management and monitoring.

All of the identified species will be required to travel a short distance farther to the reservoir or Clarkston Creek to obtain water if the canal is piped. It is very unlikely that this project will have a negative lasting effect on the species and would endanger them more. With the planting of the vegetation, this project will help sustain but it is not anticipated that through this project that the reduction of the listed species will occur through the projects efforts.

Figure 1. Newton Reservior and impact site 1. Figure shows areas to be treated (see treatment section) as well as adjacent landowner property lines.

Figure 2 - Habitat Treatment

Figure 2. Newton Reservior and impact site 2. Figure shows areas to be treated (see treatment section) as well as adjacent landowner property lines.

Figure 3 - Habitat Treatment

Eval Criterion D: Water Marketing

As mentioned previously, there are 202 shareholders in the NWUA. The 1,980 acre-feet of water allows distribution of a higher percentage of water per share. The water saved allows users to market their surplus or contribute to the existing water market.

The NWUA has contracted with the BOR to deliver the project water to its shareholders. The water can only be used in the project area.

All of the land identified within the NWUA boundary will benefit from this project because water will be delivered to the crops when it is needed versus availability. Depending on how full the reservoir reaches, it is anticipated that the water will last longer each summer allowing for a mature growth of crops.

The duration of the water market is long term.

Eval Criterion E: Other Contributions to Water Supply Sustainability

Subcriterion E.1: Addressing Adaptation Strategies in a WaterSMART Basin Study

The proposed project is not located within an area identified in any WaterSMART Basin Study.

Subcriterion E.2: Expediting Future On-Farm Irrigation Improvements

The WaterSMART Grant project would assist and expedite future on-farm irrigation improvements that could be covered under the EQIP or AWEP programs of the NRCS. These improvements include switching out pumps for variable speed motors and smaller horsepower motors and installing pivots.

The water saved from going from an open canal to a piped system will give farmers more water and make it more feasible for them to make on-farm improvements. It is expected that all pumps will have from 15 PSI to 35 PSI which will save electrical pump costs and horse power requirements.

NRCS calculates a 20% water savings when wheel/hand lines are converted to pivot irrigation. This project has expedited on farm improvements. Currently, 5 irrigators have applications into NRCS, for EQIP funding, to convert wheel/hand lines to pivots irrigation systems. Total acreage that will be converted is 335 acres. Figure 4 below identifies the pivot irrigation locations. In the figure location A is Curtis Larsen's 65 acres; B is D&S Dairy's 120 acres; C is Jack Larsen's 55 acres; D is Terry Griffin's 45

acres; E is Kim Haws' 40 acres and F is Gordon Jenkins 15 acres. It is anticipated that additional pivot locations will be available in the future.

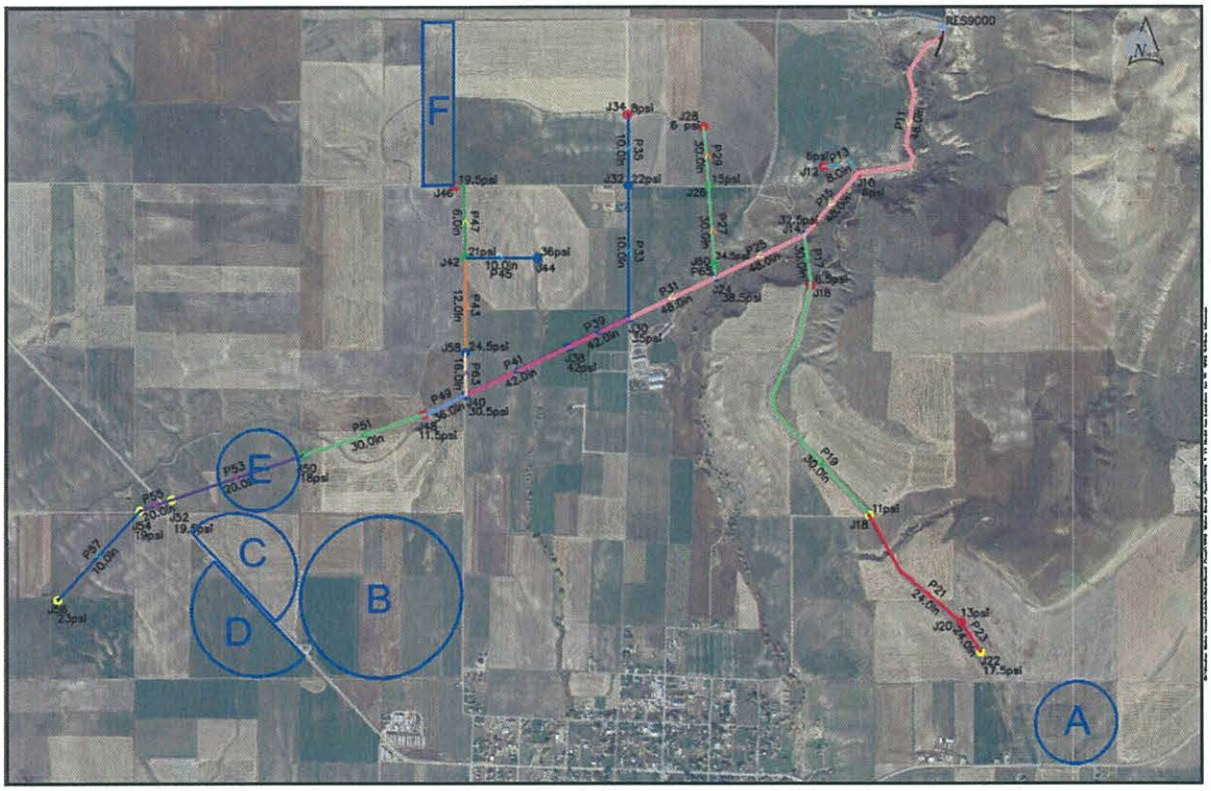


Figure 4 - Future On-Farm – EQUIP Project Locations

Subcriterion E.3: **Building Drought Resiliency**

Water Availability:

The project will include several other benefits to water sustainability. Among these benefits are longer period of water storage in the reservoir which allows for more recreational use, reducing the spread of noxious weeds within the system, and reducing health hazards related to chemical treatment of the water, and the health risk of having an open canals in the community.

The amount of precipitation received during the year determines on how much water is available for irrigation. Even during above average water years, the users still require more water to produce better crop yields. In below average water years, the availability of water is of the utmost importance to the local user and becomes a source of contention. During below average water years, the Association's water master must

ration the available water to all the users by reducing the amount of water allotted to each share.

The NWUA allocates the available water each year according to the snow pack and water within the reservoir prior to run-off. They have the rights to the entire capacity of the reservoir and often discharge to minimum levels. With consecutive years of drought, coupled with the arid, desert climate, the users understand the importance of efficiently using their resources to maintain irrigation supply and conveyance for the entire growing season. With the conservation of 1,980 acre-feet annually, the water supplies can be stretched farther even in tough drought circumstances.

Enclosing the canals will greatly limit the locations where noxious weed seeds can enter the distribution system, thereby limiting the spread of noxious weeds. Dangerous chemicals are currently used to limit the growth of algae in the open ditches. A previous chemical applicator to the NWUA had a fatal accident with one of these chemicals. Once the water is conveyed in enclosed pipelines, algae growth will cease to be a concern and the chemicals will not be required, thus increasing the safety.

The rural town of Newton is largely comprised of self-employed agriculture based entities; hence, the impact of conservative methods of irrigation will provide long lasting effects to all. Outlined below are seven (7) objectives that the improvement project will accomplish:

1. Conserving water longer throughout the year will provide Newton Reservoir with more water longer into the year, thus increasing the recreation days per year on Newton Reservoir.

2. Eliminating canal overflow water from reaching Newton Creek and Cutler Reservoir.

3. Reducing noxious weeds spread by the canal system.

4. Assisting in achieving the desired TMDL limits.

5. Eliminating soil erosion and other water contaminates that are created or encouraged by the open channel flow and debilitated flow structures.

6. Reducing operation and maintenance costs by eliminating the annual burning of ditch banks and application of chemicals to kill weeds and keep canals free of moss and algae.

7. Overall safety to the community is enhanced when open channel canals are piped.

Subcriterion E.4: **Other Water Supply Sustainability Benefits**

For many years Newton consisted of about 500 residents but over the past twenty years Newton has grown to now over 780. Newton has grown slowly and the growth comes both from people moving from the City for a little more rural way of life and our children returning home. Our ability to grow is totally dependent on our water supply. None of the wells drilled by the towns have enough water to meet the culinary needs. Newton pipes their culinary water from springs about 3-4 miles north of Clarkston. This area is also part of the drainage coming off the Clarkston Mountains that feed the Clarkston creek which in turn is the main supply for the Newton Reservoir.

During hot dry summers the secondary water helps to alleviate the demand on the culinary water system. This encourages and supports collaboration among Newton Town and NWUA, which ultimately affects the majority of the population. The support for this project is addressed extensively in this proposal.

Water and conservation efficiency efforts are increased with the metering in the new system. Additionally, NWUA will be able to more efficiently manage the resources.

Eval Criterion F: Implementation and Results

Subcriterion F.1: Project Planning

NWUA has a water conservation plan. This plan is on file with the Utah Division of Water Resources. The plan can be provided to Reclamation upon request.

Subcriterion F.2: Readiness to Proceed

The NWUA has been very busy. The project detailed design is completed, the easements have been prepared, the NEPA process is near completion, stream alteration permits have been submit, and all other local permits have been obtained. Coordination with BOR has been ongoing throughout 2014. Monthly meetings have been held to update the progress of the project. Scott Winterton, in Reclamation's Provo office has been coordinating these efforts. NWUA has finalized contracts with Reclamation so the design work through the dam can be completed.

NWUA has $3.26 million dollars secured for this project. These funds are committed through Utah Division of Water Resources and their own contribution. NWUA is currently working on the design, permitting, and environmental clearances. It is anticipated that these activities will be completed during the summer of 2015. Once the 2015 irrigation season is completed, construction would begin near the dam and work would continue down gradient. Work will continue until money or winter weather stops the progress. During the spring of 2016, construction activities will commence until the irrigation season begins in May. If needed, the last portions of the pipeline construction will be finalized after the 2016 irrigation season. Please refer to the schedules below.

Schedule – Year 1																	
Milestone/Task	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16
Obtain Easements	■																
Finalize Design	■																
WaterSMART Committal of Funds						■											
Board of Water Resources Design Review and Approval	■																
Bid Project		■															
Board of Water Resources Loan Closing			■														
Award			■														
Construction				■	■				■	■	■	■					
BOR Project Design thru Dam	■	■	■	■	■	■	■	■									

Subcriterion F.3: **Performance Measures**

Flow measurement records will be used to compare diversion flows to the NWUA's system before and after project completion. Water measurement tests will be conducted in the spring and fall of 2015 while the project is under design to measure the amount of water lost through seepage. This data will be used in conjunction with the 2011 and 2014 data presented in Subcriterion No. A.1. Weather data will be used to estimate evaporation which will then be subtracted from the total loss measured by testing.

After project completion, meter readings will be recorded and losses will be calculated within the conveyance system. The post-project losses will be compared with the pre-project losses to verify increased efficiency in the delivery of water to users in the NWUA.

Subcriterion F.4: **Reasonableness of Cost**

The total project cost is estimated to be $3.56 million, including engineering, environmental work, and construction. A 100-year life expectancy is available on HDPE. The proposed improvements are anticipated to have a useful life of 100 years. This funding application request is for $300,000 from Reclamation to leverage $3.26 million from the Association's members. There is approximately 1,980 acre-feet of water that will be conserved, not to mention that the total 5,500 acre-feet will be better managed.

$$\frac{Total\ Cost}{Annual\ Acre\ Feet\ X\ Improved\ Life}$$

$$\frac{\$3{,}560{,}000}{5{,}500\ Acre\ Feet\ X\ 100\ Years} = \$6.47\ per\ Acre\ Foot - Year$$

Eval Criterion G: Additional Non-Federal Funding

The Association has funding in place from the Utah Board of Water Resources for 86 percent of the project. Local match funds will supply another 6 percent of the project. The overall non-Federal project funding equals $3,260,000, or 92 percent of the project cost as shown below.

$3,260,000 = 92% of $3,560,000

Eval Criterion H: Connection to Reclamation Project Activities

As previously noted, the Bureau of Reclamation (BOR) has maintained ownership of Newton Dam and Reservoir. The reservoir has been the topic of multiple studies and projects. Among these are studies from the EPA, Bureau of Reclamation, Utah State University, and other Federal and State Government entities. The BOR owns 66% of the shoreline adjacent to Newton Reservoir and monitors the inflow and outflow waters. Water from the project is received from Newton Reservoir. BOR owns water rights used by the NWUA. Furthermore, there are other BOR projects in the area including Cache County and Preston.

D. Performance Measures

D.1. Environmental and Cultural Resources Compliance

The Newton Water Users have hired historical and cultural inventory experts to review the project and document their results. These results have been summarized and the NEPA documents submitted to Bureau of Reclamation, Provo Utah Office. Rick Baxter, a Fish and Wildlife Biologist for the Bureau of Reclamation made the follow comment with regards to the status of the NEPA documents to Scott Archibald of Sunrise Engineering on January 21, 2015.

> *The purpose of this email is to let you know that we have completed all but one process regarding environmental compliance for the Newton Canal enclosure project. That process is consultation with the potentially affected tribes. After the tribe reviewed the Environmental Assessment and cultural report, they sent us a letter with a few of their concerns. The concerns in the letter were addressed by our cultural specialist in a letter of response. That letter was sent this week. If they cannot put forth substantive information regarding potential effects to resources in that area, we will finalize the NEPA document and sign a FONSI. That would complete the NEPA and environmental compliance processes. All other environmental work, with which BOR was tasked, is complete.*
>
> *If you have additional questions about this process please contact me using the information in my signature block below. I'm happy to help in whatever way I can.*

Rick Baxter
Fish and Wildlife Biologist
Bureau of Reclamation
801.379.1078
rbaxter@usbr.gov

The construction will take place during the non-irrigation periods, late fall and early spring. The proposed pipeline will be constructed in the canal and backfilled. Fugitive dust will be controlled by water trucks. A storm water pollution prevention plan will be put into place to ensure that run-off water doesn't impact Newton Creek or Cutler Reservoir. The effects on wildlife are anticipated to be very minor. Mitigation for construction pollutants will be the enforcement of appropriate BMP's. The canal will be dry for the duration of the project, minimizing any pollutants or sediments that may be transported via flowing water.

There are wetlands within the project boundaries; these areas have been surveyed and reviewed by the Army Corp of Engineers.

The delivery system was constructed by the BOR in conjunction with the dam in 1948.

The canals do have head gates and diversion structures that have been modified over time by the local farmers. They will be altered or replaced at the enclosure of the canal. Where head gates are located it is planned to install a pipe stub, valve, and meter for each user to connect their individual irrigation system to the canal delivery system. Due to the installation of a piped system the new appurtenances will be more efficient and accurate in relaying, directing, and quantifying volumes. The water users have expressed interest in altering the effluent structure through the dam and will only due so upon available funding.

The Newton Dam and Newton Reservoir are listed on the National Registry. There are no other historical features know within the project boundaries.

There are no known archeological sites within the proposed project area.

It is anticipated that the only financial effects will be to those currently owning shares or purchasing shares in the future. There are no known disproportionately high and adverse effects on low income or minority populations.

The project will not affect any tribal lands.

By enclosing the canal it will eliminate the spread of noxious weeds along the existing open channel.

D.2. Required Permits and Approvals

The permits that will be required for this project include a local road crossing permit and construction approval from BOR along with a NEPA clearance. During the design process, the Cache County road department was consulted so that road crossings are designed in an acceptable manner. Road crossing permits will be obtained by the winning contractor after the project is awarded. BOR has reviewed the design drawings and provided comments. The BOR is aware of the project and meetings have been held every month for 9 months to identify expectations for the project. A FONSI for the NEPA documents are anticipated in the next few weeks. Stream alteration permits have been submitted to Army Corp of Engineers.

D.3. Official Resolution

See Appendix A.

D.4. Project Budget

There is wide spread support for the project. In addition, to the shareholders the community of Newton, Cache County, and Utah Division of Water Resources support the project.

Funding Plan and Letters of Commitment:
Currently, the Association has spent over $200,000 of reserve on this project. These funds have been spent on detailed design, easement preparation, surveying, modeling of the pipeline, and attorney fees. These expenses were realized beginning in 2014 to present.

Another $3.06 million will be provided through a loan from Utah Department of Water Resource (see attached commitment letter). The Association has received funding approval from the UDWR board. Loan terms are planned for 20 year at 2 percent interest. These funds are available as soon as the Association closes the loan with UDWR. It is anticipated that the loan will be closed upon receipt of an acceptable construction bid spring of 2015.

Table 4: Summary of non-Federal and Federal funding sources

Funding Source	Funding Amount
Non-Federal Entities	
Newton Water Users Association	$ 200,000
Utah Department of Natural Resources	$ 3,060,000
Non-Federal Subtotal:	$
Other Federal Entities	
	$
Other Federal Subtotal:	$
Request Reclamation Funding	$ 300,000
Total Project Funding	$ 3,560,000

Table 5: Funding Group I Funding Request

Funding Group I Request		
Year 1 (FY 2015)	**Year 2 (FY 2016)**	**Year 3 (FY 2017)**
$300,000		

Table 6: Funding Sources

Funding Sources	**Percent of Total Project Cost**	**Total Cost by Source**
Recipient Funding	91%	$ 3,260,000
Reclamation Funding	9%	$ 300,000
Other Federal Funding	0%	$ -
Totals	**100%**	$ 3,560,000

As previously discussed, the Association has contribute $200,000 of reserved funds for the design and easement preparation of the project. The remaining $3,060,000 will be available through a loan from UDWR and will be paid for by an increase in user share rates. It is anticipated that the BOR will contribute $300,000 through the WaterSMART program. The Association will contribute in-kind labor and management throughout the process by construction management assistance, plan review, minor excavation, survey, remove and dispose of existing concrete lining, and assistance with pollution mitigation. The Water Users Association will provide in-kind contributions both as individual users and as an association.

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Water Resources
ERIC L. MILLIS
Division Director

January 8, 2015

Val Jay Rigby, President
Newton Water Users Association
PO Box 81
Newton, UT 84327

RE: Letter of Support Newton Water Users Association

Dear Mr. Rigby:

The Utah Board of Water Resources is very supportive of your plans to pipe your association's current ditch system. Piping open canal systems typically saves up to one-third of the water available; for a system irrigating 3,400 acres with eight miles of open ditch, this savings would be significant.

Additionally, on August 14, 2014 the Board of Water Resources committed funds for up to $3,060,000 of the total cost of the project which is $3,600,000, with payments of $187,000 per year for 20 years at 2% interest.

Sincerely,

Russell Hadley

Russell Hadley, P.E.
Water Resources Engineer

1594 West North Temple, Suite 310, PO Box 146201, Salt Lake City, UT 84114-6201
telephone (801) 538-7230 • facsimile (801) 538-7279 • TTY (801) 538-7458 • www.water.utah.gov

Budget Proposal

A cost proposal outlining the projected costs and other expenses for the Newton Canal Piping Project is attached and can be found on the following two pages. Budget Form SF 424C along with an Opinion of Probable Cost, provides all expected expenses for the project. The unit prices listed in the Opinion of Probable Cost include material and installation costs.

Budget Narrative

Within the cost proposal on the following page are outlined the expected costs for construction labor and materials, as well as all professional fees associated with investigations, design, construction administration and easement preparation and acquisition. The opinion of probable costs was compiled by Sunrise Engineering, Inc. and supplied to the Association from experience in similar projects and engineers estimates.

Included in the opinion of probable cost is an environmental compliance cost to cover any costs incurred by Federal environmental laws and documents. Documentation of the project status, progress, evaluations, meetings, and as-built maps will be provided by Sunrise Engineering, Inc. and is outlined within the opinion of probable costs within the professional fees section. The contingency for the project is 10% the total project cost, totaling $280,700. The total project costs are $3,560,000 for the Newton Canal Enclosure. Refer to Table 6 above to see a summary of the funding sources.

Sunrise Engineering Team Members

Rates	Proj. Mgr	Engineer III	Engineer I	Engineer Tech III	Drafter	GIS Tech II	Const. Observer III	Admin I	Survey Crew Chief	Mileage
Hourly Billing Rate	$138.00	$119.00	$85.00	$98.00	$57.00	$65.00	$80.00	$39.00	$116.00	$0.59
Composite Direct Labor Rate	$40.12	$34.59	$24.71	$28.49	$16.57	$18.90	$23.26	$11.34	$33.72	
Overhead	$61.78	$53.27	$38.05	$43.87	$25.52	$29.10	$35.81	$17.46	$51.93	
Fringe Benefits	$16.05	$13.84	$9.88	$11.40	$6.63	$7.56	$9.30	$4.53	$13.49	
Indirect Labor	$20.06	$17.30	$12.35	$14.24	$8.28	$9.45	$11.63	$5.67	$16.86	

SUNRISE ENGINEERING, INC.
CONSULTING ENGINEERS AND SURVEYORS

SUNRISE ENGINEERING

Opinion of Probable Cost

Project:	NEWTON IRRIGATION SYSTEM UPGRADE	Project No:	04397
		Date:	20-Jan-15
Owner:	NEWTON WATER USERS ASSOCIATION	Sheet:	1 of 1
		By:	TCS

ITEM NO.	ITEM	QUANTITY	UNIT	UNIT PRICE	AMOUNT
1	Mobilization	1	L.S.	$ 83,500	$ 83,500
2	6" Pipeline	1,300	L.F.	$ 12	$ 15,600
3	8" Pipeline	750	L.F.	$ 14	$ 10,500
4	10" Pipeline	3,500	L.F.	$ 18	$ 63,000
5	12" Pipeline	1,450	L.F.	$ 25	$ 36,250
6	16" Pipeline	700	L.F.	$ 32	$ 22,400
7	20" Pipeline	2,900	L.F.	$ 40	$ 116,000
8	24" Pipeline	2,900	L.F.	$ 55	$ 159,500
9	30" Pipeline	9,850	L.F.	$ 74	$ 728,900
10	36" Pipeline	750	L.F.	$ 91	$ 68,250
11	42" Pipeline	2,900	L.F.	$ 105	$ 304,500
12	48" Pipeline	7,900	L.F.	$ 118	$ 932,200
13	Road Borings	140	L.F.	$ 300	$ 42,000
14	Air Vent Assemblies	38	Each	$ 500	$ 19,000
15	Service Connection Fittings, Valves & Tie-ins	34	Each	$ 3,000	$ 102,000
19	Service Meters	34	Each	$ 2,600	$ 88,400
20	Surface Repairs (Road Crossings)	1	L.S.	$ 15,000	$ 15,000
	CONSTRUCTION SUBTOTAL				**$ 2,807,000**
21	Construction Contingency (10%)	1	L.S.	$ 280,700	$ 280,700
	CONSTRUCTION TOTAL				**$ 3,087,700**
22	Environmental Investigation Study	1	Each	$ 43,500	$ 43,500
23	Preliminary Engineering Costs	1	Each	$ 7,400	$ 7,400
24	Engineering Design	1	Each	$ 135,400	$ 135,400
25	Construction Bidding, Admin & Observation	1	Each	$ 195,000	$ 195,000
26	Easement Preperation	1	Each	$ 30,000	$ 30,000
27	Distribution Engineering Model	1	Each	$ 32,600	$ 32,600
28	WaterSMART Grount Application	1	Each	$ 4,500	$ 4,500
29	Administrative and Legal Expenses	1	Each	$ 23,900	$ 23,900
	PROFESSIONAL SERVICES SUBTOTAL				**$ 472,300**
	TOTAL COST				**$ 3,560,000**

E. Funding Restrictions

The proposed funding plan does not include any expenses prior to July 1, 2014.

Appendix A – Official Resolution

Official Resolution

The President of the Association is Val Jay Rigby, and he will be the legal authority on the project.

RESOLUTION

NO. 01-2015

AUTHORIZING THE PRESIDENT OF THE NEWTON WATER USERS ASSOCIATION TO APPLY FOR A CONTRIBUTION GRANT FROM THE U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, FOR THE RENOVATION AND ENCLOSURE OF THE NEWTON EAST AND WEST CANALS

WHEREAS, the U.S. Department of the Interior, Bureau of Reclamation, provides a funding opportunity as part of the WaterSMART: Water and Energy Efficiency Grants for FY 2015; and,

WHEREAS, the Newton Water Users Association, (the "Association") of Newton, Utah deems it necessary to apply to the Department of the Interior, Bureau of Reclamation, for funding through a cost sharing grant not to exceed $300,000 for construction to renovate and enclose the canal delivery systems beginning at the source, Newton Reservoir. The project will increase water delivery efficiency and provide more efficient means of irrigation to the users within the Association; and,

WHEREAS, in accordance with the rules and regulations of the WaterSMART: Water and Energy Efficiency Grant, the Association is required to adopt a resolution to accompany such application;

NOW, THEREFORE BE IT RESOLVED BY THE NEWTON WATER USERS ASSOCIATION, OF NEWTON, UTAH, THAT:

1. The Newton Water Users Association authorizes Val Jay Rigby, President Newton Water Users Association, to apply for and accept grant funding in the amount not to exceed $300,000 for the renovation and enclosure of the Canals as described above.
2. The Association in addition to President Val Jay Rigby have reviewed and are in support of the application submitted to the Bureau of Reclamation for the above stated grant opportunity.
3. The Association agrees that funds to match the cost share of $3,260,000 can be available through in kind contributions, reserve funds and a loan from Utah Division of Water Resources.
4. If the applicant is selected for award, the Association will work with the U.S. Department of the Interior, Bureau of Reclamation, to meet established deadlines for entering into a cooperative agreement.

Adopted this 20th day of January 2015.

ATTEST:

By: _____ Val Jay Rigby, President

By: _____ Steve Griffin, Vice President

By: _____ Kelly H. Griffin, Member

By: _____ Clair D. Christiansen, Member

By: _____ Joseph G. Larsen, Member

By: _____ Kim Haws, Member

By: _____ Van Jenkins, Member

The following is a list of the Newton Water Users Associations board members.

Val Jay Rigby..... President
Steve Griffin ..... Vice President
Kelly Griffin ..... Member
Clair Christiansen ..... Member
Val Jay Rigby .....Member
Kim Haws..... ..... Member
Van Jenkins..... Member

Appendix B: Letters of Support

CACHE COUNTY
CORPORATION

M. LYNN LEMON
COUNTY EXECUTIVE/SURVEYOR

199 N. MAIN
LOGAN, UTAH 84321
TEL 435-755-1850
FAX 435-755-1981

COUNTY COUNCIL
CRAIG "W" BUTTARS
VAL K. POTTER
JON WHITE
KATHY ROBISON
H. CRAIG PETERSEN
CORY YEATES
GORDON A. ZILLES

November 27, 2012

Newton Water Users Association
Joseph G. Larsen, President
5397 West 7200 North
P.O. Box 94
Newton, UT 84327

Re: Newton Water Users Association – Pipe Existing Open Canal

Dear Mr. Larsen:

This letter is in support of your project to pipe the existing open Newton Canal. Cache County feels this is a worthy project for the future efficient and wise use of that water.

Sincerely,

M. Lynn Lemon

M. Lynn Lemon
Cache County Executive

NEWTON TOWN CORPORATION

51 South Center
P.O. Box 146
Newton, UT 84327
(435)563-9283

Mayor
Clair D. Christiansen

Council Members:
Matt Hansen
Kathryn Rigby
Matt Phillips
Jed Woodward

On behalf of the town of Newton, I would like to add my support for the water project being proposed by the Newton Irrigation Company.

For many years our town consisted of about 500 residents but over the past twenty years we have grown to now over 780. We have grown slowly and the growth comes both from people coming out our way for a little more rural way of life and of course we have many of our own children who choose to stay here. Our ability to grow is totally dependent on our water supply. Every town board for the last twenty years has gone out looking for more culinary water. Not many years ago Dr. Oaks from Utah State University and his graduate students came over to the west side of Cache Valley and drilled many test holes studying the availability of water. It seems in Cache Valley there are plenty of successful wells on the east side, but here on the west there has been very limited success. Both Newton and Clarkston have gone out and hired engineering firms and drilled wells, with basically no success. None of the wells drilled by the towns had enough water to bring into the system. Both towns get their culinary water from springs about 3-4 miles north of Clarkston and pipe it into town. This area is also part of the drainage coming off the Clarkston Mountains that feed the Clarkston creek which in turn is the main supply for the Newton Reservoir.

With our limited water supply it's very important we use that water efficiently and wisely. We have about 260 homes in town that we provide culinary water to. Probably close to 40 years ago the Newton Town Sprinkling Company was formed by a forward thinking town board that took out all the open ditches in town and put in a pressurized secondary water system. If this system were not in place, the town literally would not be able to furnish enough water for outside use, our growth would have stopped long ago. We currently have over 200 lots in town that could be developed, but our limited water supply again is the limiting factor.

We really believe if we could join with the reservoir board and help put a system in place that would do away with the open ditches and pressurize the whole system, there would be a tremendous advantage in our ability to stretch the limited water we now have. The efficiency and water we would gain thru this system would really help us in our desire to provide enough water for our residents. Some of our neighboring towns do not have a secondary system and they regularly have to limit outside watering.

We have a town square and a soccer field which really add great value to our quality of living and overall satisfaction for our residents all of which are dependent on us being able to provide those facilities.

Our 260 residents use approximately 325-350 shares of those allotted from our reservoir and it is part of the life blood for our community. Every enhancement and improvement to stretch our limited water supply is of utmost value to the residents of Newton.

Sincerely,

Clair Christiansen
Mayor, Newton Town

Newton Town Planning and Zoning Commission
Gene Dayley, Julie Wickham, Mike Peterson, Bruce Erickson, and Helen Rigby, Chairperson
Newton Town Hall
PO Box 146
Newton, Utah 84327
May 11, 2010

Newton Water Users Association
Joseph G. Larsen, President
5397 W 7200 N
PO Box 94
Newton, Utah 84327

Dear Mr. Larsen;

The Newton Town Planning Commission supports the proposal by Newton Water Users Association to pipe the existing open canal.

Current zoning and building regulations in our community require that a new residence built on a lot within the town must have one share of secondary water before a building permit will be issued. This was enacted in an effort to discourage use of culinary water to water lawns and landscapes. Newton Town has a limited supply of culinary water, and we need our citizens to use secondary water for any outside watering needs so that we will have adequate drinking water in the summer.

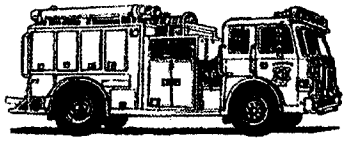
At the present time the out-dated canal system cannot deliver enough secondary water to Newton Town and still deliver the needed water to canal users. We support the efforts to upgrade an inadequate system that loses one-third of its water supply. With that one-third restored, one share of water would take care of the outside watering needs of a town lot.

If we can provide further information or assistance, please feel free to contact me or other members of the planning commission.

Sincerely,

Helen P. Rigby

Helen P. Rigby, Chairperson
Newton Town Planning and Zoning Commission



NEWTON FIRE DEPARTMENT
51 South Center
Newton, Utah 84327

To Whom It May Concern:

In the area served by the Newton Water User's Association irrigation system there are many residential properties, as well as farm buildings and feed storage areas. The Newton Fire Department is responsible for fire suppression for these occupancies.

These areas do not have fire hydrants. Our fire suppression vehicles carry equipment that allows us to access the irrigation water system. We have used the irrigation water system as a water supply source on past incidents, drafting from the canals or directly connecting to the pressurized risers.

During the months when the irrigation system is in use, our ability to access the system for fire suppression purposes is a valuable recourse. If a fire occurs in one of the occupancies within the area it serves, it allows us to have a water supply source closer to the fire.

We support the Newton Water User's Association proposal. We hope that this added benefit of seasonal fire suppression to the community will be considered when the proposal is being reviewed.

Sincerely:

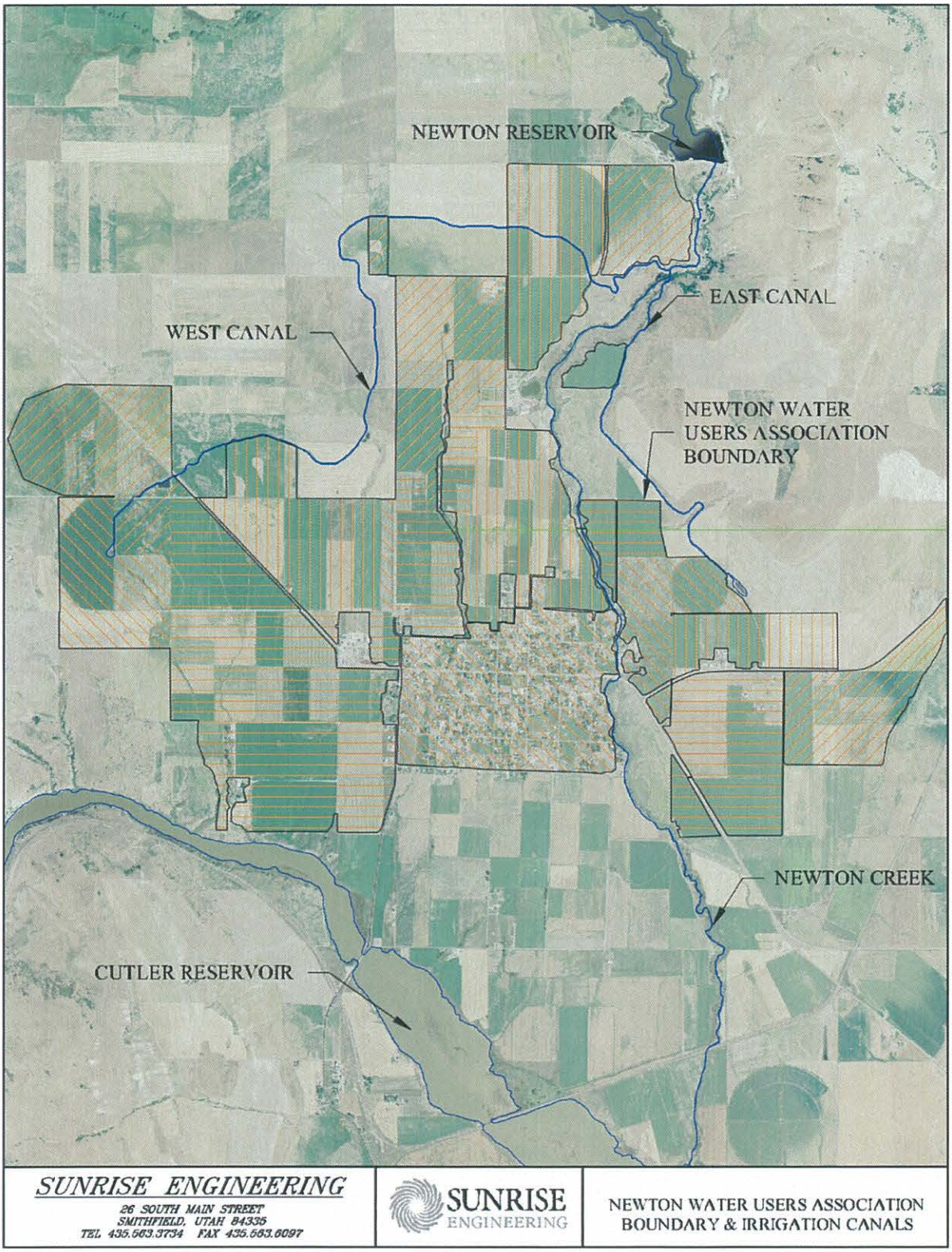
Gregory M. Jorgensen
Fire Chief
Newton Fire Department

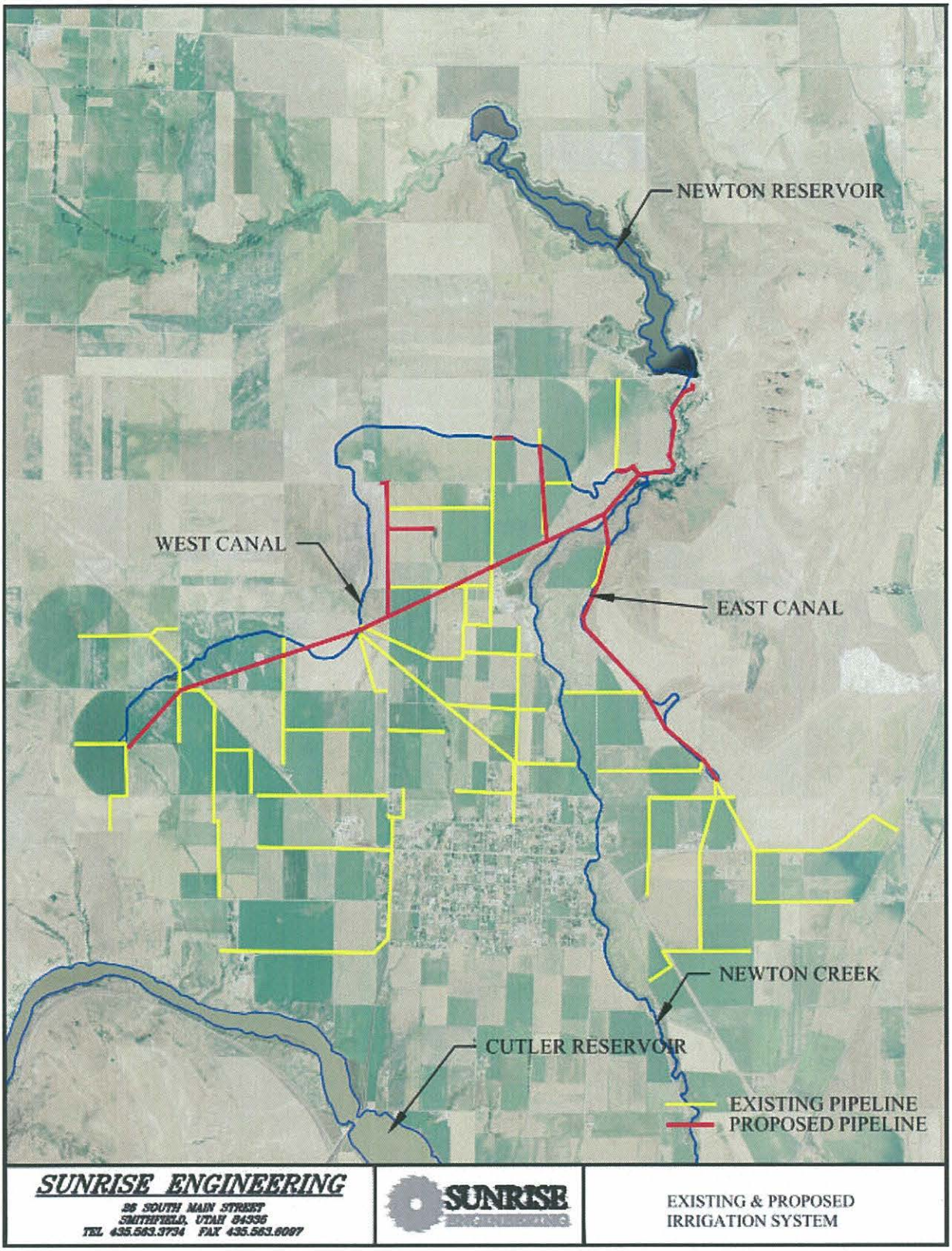
Greg R. Fabricius
Assistant Fire Chief
Newton Fire Department

Curtis W. Larsen
Assistant Fire Chief
Newton Fire Department

P.O. BOX 146
NEWTON, UT 84327
P.H. 435-563-9283

Appendix C: Supplementary Information and Maps




NEWTON RESERVOIR
WEST CANAL
EAST CANAL
NEWTON CREEK
CUTLER RESERVOIR
EXISTING PIPELINE
PROPOSED PIPELINE
SUNRISE ENGINEERING
86 SOUTH MAIN STREET
SMITHFIELD, UTAH 84335
TEL 435.563.3734 FAX 435.563.6097
SUNRISE
EXISTING & PROPOSED
IRRIGATION SYSTEM

Newton Water Users Flume Measurements

Parshall Flume at Dam	
Date	**Q (cfs)**
21-Jul	21.00
27-Jul	20.00
3-Aug	4.00
10-Aug	18.50
18-Aug	27.50
24-Aug	32.50
31-Aug	29.00
7-Sep	14.00
13-Sep	10.00

Governing Equations for Cutthroat Flumes

$$Q_f = C_f (h_u)^{n_f}$$

$$Q_s = \frac{C_s (h_u - h_d)^{n_f}}{[-(\log_{10} S)]^{n_s}}$$

$$C_f = 2.09 W^{0.915}$$

$$n_f = 2.0936 L^{-0.1225} - 0.128 (W / L)$$

$$n_s = 2.003 (W / L)^{0.1318} L^{-0.07044 (W / L) - 0.07131}$$

$$S_t = 0.9653 (W / L)^{0.2760} L^{0.04322 (W / L) - 0.3555}$$

$$C_s = \frac{C_f (-\log_{10} S_t)^{n_s}}{(1 - S_t)^{n_f}}$$

1 Block = 150 gpm = 0.334 cfs

Flume	L	W	B	L_{in}	L_d	C_f	n_f
East Pond	9	1.5	3.5	3	6	3.07	1.58
East Ditch	9	1.5	3.5	3	6	3.07	1.58
West Ditch	9	1.5	3.5	3	6	3.07	1.58
Siphon	9	2.5	4.5	3	6	4.97	1.56

East Pond				
Date	**h_u (in)**	**h_u (ft)**	**Q_f (cfs)**	**# of Blocks Out**
21-Jul	13.00	1.08	3.48	3.5
3-Aug	6.50	0.54	1.16	0
10-Aug	6.50	0.54	1.16	2
18-Aug	11.25	0.94	2.77	7
24-Aug	13.75	1.15	3.80	6
31-Aug	13.38	1.11	3.64	2
7-Sep	9.50	0.79	2.12	0
13-Sep	5.50	0.46	0.89	1.5

PM

East Ditch				
Date	**h_u (in)**	**h_u (ft)**	**Q_f (cfs)**	**# of Blocks Out**
21-Jul	15.75	1.31	4.71	4
3-Aug	7.00	0.58	1.31	0
10-Aug	10.00	0.83	2.30	0
18-Aug	13.75	1.15	3.80	4
24-Aug	16.00	1.33	4.83	4
31-Aug	15.88	1.32	4.77	0
7-Sep	10.19	0.85	2.37	0
13-Sep	10.25	0.85	2.39	0

West Ditch				
Date	**h_u (in)**	**h_u (ft)**	**Q_f (cfs)**	**# of Blocks Out**
21-Jul	8.75	0.73	1.86	30
3-Aug	5.00	0.42	0.77	0
10-Aug	10.00	0.83	2.30	16
18-Aug	12.00	1.00	3.07	36
24-Aug	12.75	1.06	3.37	34
31-Aug	10.25	0.85	2.39	39
7-Sep	7.75	0.65	1.54	10
13-Sep	10.63	0.89	2.53	3

Siphon				
Date	**h_u (in)**	**h_u (ft)**	**Q_f (cfs)**	**# of Blocks Out**
21-Jul	24.00	2.00	14.69	18
3-Aug	10.00	0.83	3.74	3
10-Aug	20.50	1.71	11.48	8
18-Aug	24.25	2.02	14.93	18
24-Aug	25.75	2.15	16.40	22
31-Aug	26.00	2.17	16.65	18
7-Sep	18.25	1.52	9.57	9
13-Sep	15.50	1.29	7.41	4

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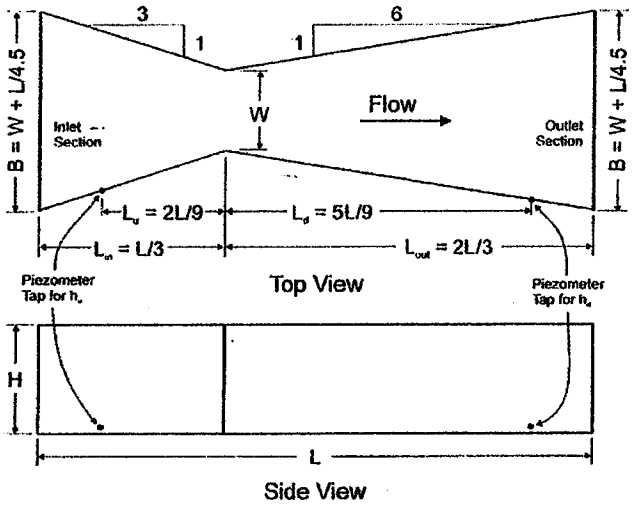

Note: Governing Equations for Cutthroat Flumes obtained from "Unified Equations for Cutthroat Flumes Derived from a Three-Dimensional Hydraulic Model," Sathaporn Temeepattanapongsa, Utah State University, June 6, 2012.

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Newton Water Users Pumping and Power Savings Estimates

Power Cost	0.07 /kW-hr
Pump Efficiency	80%
Electrical Efficiency	90%
Overall Efficiency	72.00%

Power Savings per Month (20 days)		49,534.40 kW-hr
Power Savings per Year (100 days)		247,672.00 kW-hr
Cost Savings per Month (20 days)	$	3,467.41
Cost Savings per Year (100 days)	$	17,337.04
Cost Savings Over Project Life (50 years)	$	866,852

Location	Approximate Elevation	Estimated Pressure (psi)
Dam Minimum Level	4754	0
East Ditch Head	4744	4.3
East Ditch 1/2 Way Down	4719	15.2
East Pond	4718	15.6
West Ditch Head	4734	8.7
West Ditch Near 8600 N 200 W	4715	16.9
West Middle Pond	4710	19.1
West Pond	4703	22.1

Existing Pumps

	Pump Horsepower	kW	Running Time hrs/day	kW-hr/day	Cost/day	Water Horsepower	Upstream Pressure (psi)	Target Pressure Increase (psi)	Target Head (ft)	Target Flow (cfs)
1	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
2	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
3	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
4	40	29.84	24	716.16	$ 50.13	28.8	0	45	103.86	2.44
5	40	29.84	24	716.16	$ 50.13	28.8	0	45	103.86	2.44
6	50	37.3	24	895.20	$ 62.66	36	0	45	103.86	3.05
7	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
8	20	14.92	24	358.08	$ 25.07	14.4	0	45	103.86	1.22
9	25	18.65	24	447.60	$ 31.33	18	0	45	103.86	1.53
10	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
11	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
12	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
13	30	22.38	24	537.12	$ 37.60	21.6	0	45	103.86	1.83
			Total	7,430.16	$ 520.11					

Proposed Pumps

	Target Flow (cfs)	Target Pressure (psi)	Upstream Pressure (psi)	Target Pressure Increase (psi)	Target Head Increase (ft)	Required Water Horsepower	Required Pump Horsepower	kW	Running Time hrs/day	kW-hr/day	Cost/day	Power Savings (kW-hr/day)	Cost Savings/day
1	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
2	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
3	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
4	2.44	45	15	30	69.24	19.2	26.67	19.89	24	477.44	$ 33.42	238.72	$ 16.71
5	2.44	45	15	30	69.24	19.2	26.67	19.89	24	477.44	$ 33.42	238.72	$ 16.71
6	3.05	45	15	30	69.24	24	33.33	24.87	24	596.80	$ 41.78	298.40	$ 20.89
7	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
8	1.22	45	15	30	69.24	9.6	13.33	9.95	24	238.72	$ 16.71	119.36	$ 8.36
9	1.53	45	15	30	69.24	12	16.67	12.43	24	298.40	$ 20.89	149.20	$ 10.44
10	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
11	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
12	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
13	1.83	45	15	30	69.24	14.4	20.00	14.92	24	358.08	$ 25.07	179.04	$ 12.53
									Total	4,953.44	$ 346.74	2,476.72	$ 173.37

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