SHAVANO FALLS HYDROPOWER DEVELOPMENT, UNCOMPAHGRE PROJECT, COLORADO

COPY

A PROJECT PROPOSAL SUBMITTED TO:

WaterSMART
WATER & ENERGY EFFICIENCY GRANT FOR FY 14

ON BEHALF OF:

UNCOMPAHGRE VALLEY WATER USERS ASSOCIATION
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I. TECHNICAL PROPOSAL

A. EXECUTIVE SUMMARY

January 23, 2014

Applicant Name: Uncompahgre Valley Water Users Association
City: Montrose
County: Montrose
State: Colorado

Project Start Date: June 1, 2014
Project End Date: December 31, 2015

Category: Funding Group II
Funding Request: $850,000

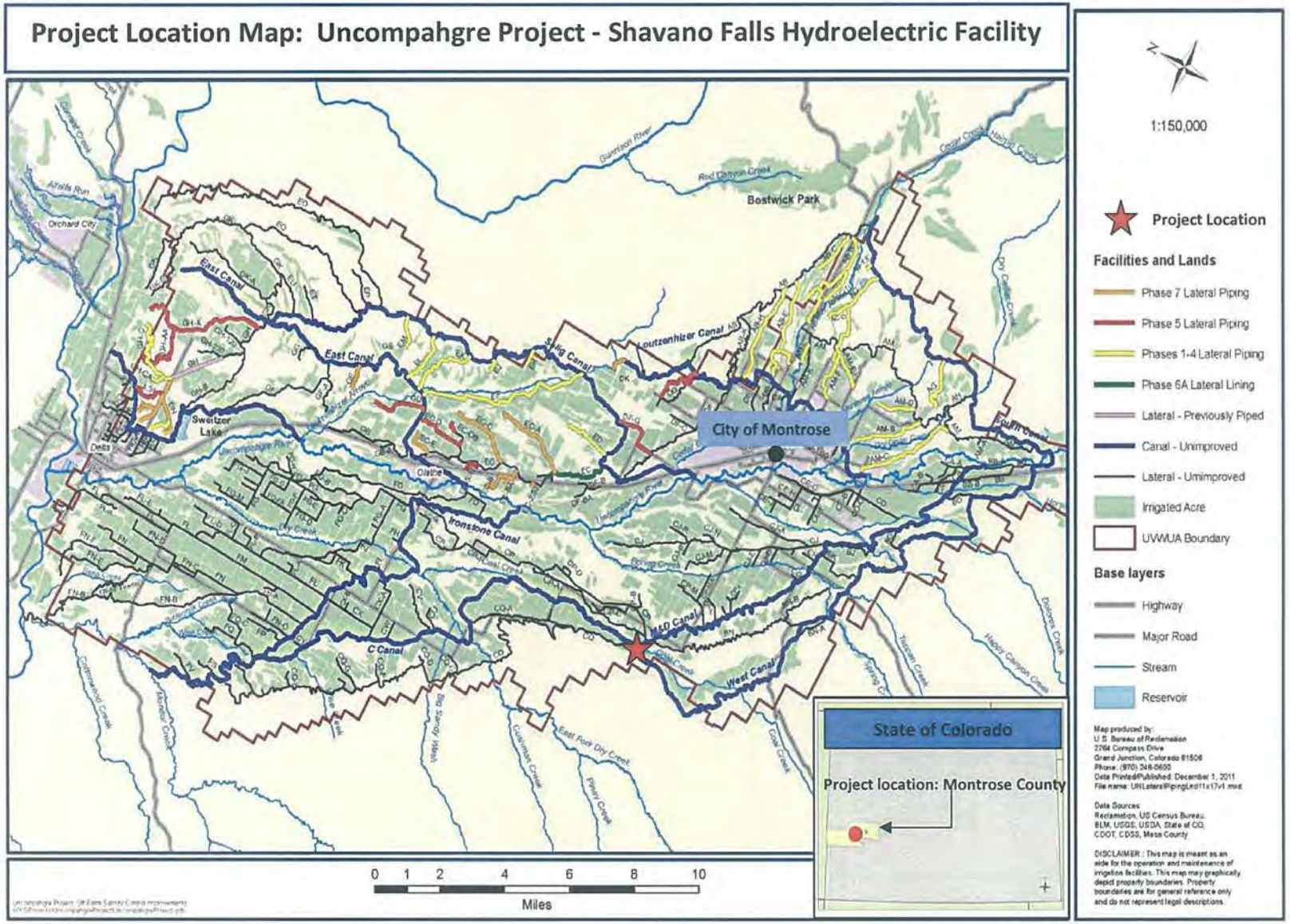
The Uncompahgre Valley Water Users Association (UVWUA) proposes to construct a 2.8MW hydroelectric facility on an existing irrigation canal drop structure known as "Shavano Falls" located on the M&D Canal in the federal Uncompahgre Project Area (UPA), approximately 6.8 miles west of Montrose, Colorado. WaterSMART Grant Program funds will be used in support of construction of the hydroelectric facility. The *Shavano Falls Hydropower Development Project* meets the following goals of the WaterSMART FOA by responding to the need for projects that: 1) result in *Water Conservation* (Task A) via improved water management associated with headgate automation and lateral lining and piping, 2) creates an Energy-Water Nexus (Task B) by implementing a *Renewable Energy Project Related to Water Management and Delivery* via small-scale hydroelectric, and 3) provides *Benefits to Endangered Species* (Task C) in a canal system serving areas with high selenium soils and results in better control of water going through the UPA which is critical to the re-operations of the Aspinall Unit for endangered species in the Lower Gunnison and Colorado Rivers.

B. BACKGROUND INFORMATION

The Uncompahgre Project Area (UPA) is one of the oldest Reclamation projects, stretching across much of western Colorado in Delta and Montrose counties (Figure 1). It was one of the first projects funded under the newly formed Reclamation Service in 1902.

Under the provisions of the Reclamation Act, the Uncompahgre Project was authorized for construction by the Secretary of the Interior on March 14, 1903 and subsequently authorized to allow for the sale of hydroelectric power under the Reclamation Act of 1938 (52 Stat. 941, Sale of Surplus Power, Uncompahgre Valley Project).

Figure 1. Project Location Map – Shavano Falls Hydroelectric Development, Uncompahgre Project



The Uncompahgre Project operates in Reclamation's Upper Colorado Region and contains 1 storage dam at Taylor Park Reservoir in Gunnison County, 7 diversion dams, 128 miles of canals, 438 miles of laterals and 216 miles of drains. Diversion dams in Montrose County include the East Portal on the Gunnison River at the Gunnison Tunnel, and the East, Loutzenhizer, Montrose/Delta (M&D), Ironstone and Selig Canal Diversions all of which are on the Uncompahgre River. Delta County is home to the Garnet Canal Diversion Dam also on the Uncompahgre River. The UPA currently has two small-scale hydroelectric facilities located on the South Canal at Drops #1 and #3 providing approximately, 3.4 MW and 2.8 MW, respectively.

The UPA draws water from the Uncompahgre River and from the Gunnison River. Water from the Gunnison River is brought to the UPA via a 5.8 mile long trans-mountain tunnel (Gunnison Tunnel) below Crystal Reservoir and the South Canal which exits to the Uncompahgre River. The UPA includes mesa and valley land at elevations ranging between 5,000 and 6,000 feet above sea level. Water is delivered to approximately 80,000 irrigated acres with approximately 3,500 shareholders utilizing water for irrigation (agricultural and municipal), stock water, and power generation. The UVWUA projects a water demand of approximately 865,574 ac-ft for 2014 (2003-2012 average diversion).

Water resources serving the UPA include the 1913 Gunnison Tunnel Water Right from the Gunnison River (1300 cfs), the 1882 Uncompahgre River Right (1225.64 cfs), and the 1937 Taylor Park Reservoir Storage Right of 106,230 ac-ft. Total direct flow water rights are therefore 2,525.64 cfs. The 10 year average annual water supply for 2003-2012 was 865,574 ac-ft (UVWUA 2013).

Shortfalls in water supply affect the UVWUA during periods of drought and when senior water right holders place calls on the rivers. In certain areas of the UP, there may be shortfalls in water supplies for landowners at the end of the lateral due to uneven flows at the headgate or in the lateral due to fluctuating river flows/levels.

The M&D Canal which currently delivers water to the proposed Shavano Falls Hydroelectric Facility, was the first canal purchased for the Uncompahgre Valley Project and was decreed in 1890. Upon acquisition, the canal was upgraded and extended to carry water diverted from the Uncompahgre River to the mesas on the west side of the Uncompahgre Valley from south of the City of Montrose to north of the City of Delta to irrigate 33,600 acres. The canal is presently 31.4 miles in length and was designed to carry flows up to 650 cfs. In total, the M&D Canal serves 75 laterals and sub-laterals for a total of 72.75 miles in length.

Flow in the M&D Canal, just upstream of the proposed hydroelectric facility, is approximately 310 cfs. Historically, the M&D Canal at this location has been managed such that on average 90 cfs is diverted to the CP Lateral while 220 cfs continues to flow in the M&D, over Shavano Falls, after which approximately 130 cfs is diverted into the CQ Lateral (130 cfs) and the

remainder flows to Coal Creek (90 cfs). It is proposed that the 220 cfs of water in the M&D Canal be diverted into the proposed Shavano Falls Hydroelectric Facility penstock that would result in no impacts to irrigation water deliveries to water users. The original canal system will be intact to act as a by-pass should the hydroelectric facility need to be shut down for any reason.

The CP Lateral supplies 37,422ac-ft/year to 165 water users on 4,800 irrigated acres. The CQ Lateral delivers approximately 54,054 ac-ft/year of water to 150 users on 7,800 acres. Coal Creek, a natural stream, carries 90 cfs of water to the lower M&D Canal system (a.k.a. C Canal System) where it provides 180 water users with 37,422 ac-ft/year on 5,700 acres. There are no diversions off Coal Creek in the 5 mile reach in which it serves as a carrier for the M&D Canal.

The Uncompahgre Valley Water Users Association (UVWUA), a 501(c)(12) not for profit entity, was incorporated in 1903 and is contracted with Reclamation to operate and maintain the UPA facilities. The UVWUA maintains a professional staff of organizational and fiscal managers, water masters, office staff, ditch riders and skilled laborers. As of December 2013 the UVWUA has completed 73.24 miles of canal and lateral lining and piping with a total of *97.68 miles expected to be completed through Phase 8 of the East Side Laterals Piping Projects (*Awaiting signed agreement from Reclamation on Phase 8). Upon completion of Phase 8, the UVWUA will have prevented an estimated total of 68,676 tons/year of salt and an estimated 2,747 to 5,494 pounds/year of selenium from entering the Colorado River with a 50-year cost-effectiveness value of $41 per ton and a total cost of $21,423,283.

The Uncompahgre Valley is a high mountain desert with rainfall averaging less than 10 inches per year. Average high temperatures are 87 degrees Fahrenheit and average lows are 15 degrees. The growing season in the UPA extends from approximately April 1 to October 31.

Principal crops produced within the area include corn, sweet corn, alfalfa, beans, peppers, onions, broccoli, potatoes, apples, pears, cherries, apricots, grass hay, pasture forages, wheat, barley, and oats. Livestock operations include beef cattle, dairy cattle, sheep, hogs, horses, and chickens.

Soils on the east side of the UPA are derived primarily of Mancos Shale which has naturally high concentrations of salts and selenium. The underlying bedrock in the region consists predominantly of crystalline and sedimentary rocks, with alluvial deposits in the valleys. The application of water to these soils via seepage from open earthen canals and laterals and on-farm irrigation deep percolation, mobilizes salts and selenium and creates hydraulic gradients that result in the discharge of saline and seleniferous groundwater into irrigation drains and local waterways. According to the Colorado Geologic Survey (2008), Mancos Shale soils are best exposed on the east side of the Uncompahgre River, except along the mesa edges on the west side of the Uncompahgre River.

The majority of soils on the west side of the UPA (west side of the Uncompahgre River) are composed of Dakota sandstone and various Quaternary Alluvium Units (Thomas, 2007)

including Mesa soils. Dakota Sandstone is a "geologic formation composed of sedimentary rocks deposited on the western side of the Late Cretaceous Western Interior Seaway" (Monroe and Wicander, 1997) in areas such as the west side of the UPA and are naturally high in salinity. As indicated in the previous paragraph, there are mesas on the west side of the UPA which are underlain by Mancos Shale (http://www.co.montrose.co.us/DocumentCenter/Home/View/119). One example of such an area is California Mesa which receives irrigation water from the M&D Canal and the CQ Lateral (sub-lateral off the M&D Canal in the immediate vicinity of the proposed hydroelectric facility). Within the UPA, there are approximately 27,278 irrigated acres in Mancos Shale adobe soils and 56,953 acres in Mesa soils.

The UVWUA has significant prior experience working successfully with Reclamation, primarily through the Salinity Control Program and has contracted to carry out 7 phased, large lateral piping projects (waiting for executed agreement on Phase 8). In addition, the UVWUA is working with Reclamation on other irrigation delivery system efficiency projects and a current system optimization review/study (SOR) (see summary below). UVWUA staff work directly with Reclamation designers, engineers, surveyors, grant officers, and environmental compliance staff to carry out multiple aspects of on-going projects. In addition, the UVWUA has served alongside Reclamation on stakeholder groups working to increase public awareness about critical water resource, water-quality and endangered species concerns.

Previous projects include the:

- LOWER GUNNISON BASIN WINTER WATER PROGRAM - This program was funded through the Colorado River Basin Salinity Control Program for the construction of stock water taps which were provided in lieu of water being diverted through the Gunnison Tunnel from October 15 through April 15 of each year with an estimated 41,330 tons/year of salt controlled and an estimated range of 1,653 to 3,306 lbs/year of selenium controlled.

- PHASE I - MONTROSE ARROYO DEMONSTRATION PROJECT (Contract No. 98-FC-40-1300). The project involved piping 7.5 miles of open, earthen laterals for salinity control during the period 9/23/98 to 12/31/01. Salt controlled = 2,520 tons.

- PHASE II – EAST SIDE LATERALS PIPING PROJECT (Contract No. 04-FC-40-2243). The project involved piping 21 miles of open, earthen laterals for salinity control during the period 9/27/04 to 12/31/09. Salt controlled = 6,139 tons.

- PHASE III – EAST SIDE LATERALS PIPING PROJECT (Contract No. 07-FC-40-2568). The project involved piping 10.5 miles of open, earthen laterals for salinity control during the period 5/15/07 to 12/31/11. Salt controlled = 2,292 tons.

•PHASE IV – EAST SIDE LATERALS PIPING PROJECT (Agreement No. 09AP40866). The project involved piping 11.4 miles of open, earthen laterals for salinity control during the period 5/15/07 to 12/31/12. This project was jointly funded by the Basinwide Salinity Control Program and the State of Colorado Non-Point Source Program. Salt controlled = 3,651 tons.

•PHASE V – EAST SIDE LATERALS PIPING PROJECT (Agreement No. R11AC40020). This project involved piping 19 miles of open, earthen laterals for salinity control during the period 8/09/11 to 12/31/15. Salt controlled = 5,034 tons.

•PHASE VI (A) – EC LATERAL LINING PROJECT (Agreement No. – See contract No.'s below). The goal of the project was to demonstrate that a new canal lining technology could be employed in the UPA to reduce selenium and salt loading to the lower Gunnison and Colorado River systems. A total 2.0 miles were lined on the EC Lateral. Salt controlled = 1,374 tons.

Project partners are identified below:

•State of Colorado Species Conservation Trust Funds: "EC Canal Lining Demonstration Project" (Agreement No. C-154160) (Construction Period: 02/09/10 to 6/30/13)

•Salinity Program Parallel Funds (Colorado Department of Agriculture): (Contract No. 22911) (Construction Period: 10/01/10 to 09/30/12)

•Colorado River District Grant (Agreement No. CG09019) (Construction Period: 08/27/09 to 04/30/12)

•PHASE VII – East Side Laterals Piping Project (Agreement No. R11AC40025). The goal of this project was to pipe 12.7 miles of open, earthen laterals for salinity control during the period 8/09/11 to 12/31/16. Salt controlled = 3,029 tons.

•PHASE VIII* – East Side Laterals Piping Project (Agreement No. – *Awaiting signed agreement from Reclamation). The goal of the project is to pipe 14.08 miles of open, earthen laterals for salinity control benefit during the period 06/01/13 to 05/30/17. Salt controlled = 3,307 tons.

At the completion of Phase 8, a total of 68,676 tons/year of salt will have been controlled and an estimated range of 2,747 to 5,494 lbs/year of selenium controlled.

C. TECHNICAL PROJECT DESCRIPTION

The UVWUA proposes to construct a 2.8 MW hydroelectric facility on an existing irrigation canal drop on the M&D Canal known as "Shavano Falls" in the UPA in Montrose, Colorado

(Figure 2). The Uncompahgre Project was authorized for construction by Congress in 1903 and subsequently the Reclamation Act of 1938 (52 Stat. 941) which authorized the Secretary of Interior to enter into contracts for the sale or development of surplus power generated as part of the project. The Shavano Falls Hydropower Project is therefore under the jurisdiction of Interior (Reclamation) and is exempt from Federal Energy Regulatory Commission (FERC) requirements. In addition, recently passed Public Law 113-24 provides the UVWUA with first rights to issuance of a Lease of Power Privilege (LOPP)." Following is a detailed project description.

PROJECT DESCRIPTION:

- Diversions/Bypass

The existing CP Lateral Diversion on the M&D Canal will be replaced and will serve as a diversion and bypass structure for the hydroelectric facility. This new structure will consist of a 20' wide by 4' high roller gate which will serve as a bypass for the hydroelectric facility. A secondary fail-safe bypass will consist of a 20' long weir and two 5' wide automatic trip gates (ATG). A second diversion, Intake, will be constructed 1200' downstream in the CP Lateral to direct flows to the steel penstock for hydropower generation. New headgates will also be installed at this location to control the water in the CP Lateral. A third diversion, CQ Lateral Outlet, will be constructed downstream of the powerhouse in the CQ Lateral to divide water between the CQ Lateral and Coal Creek.

- Canal System

The M&D Canal is an earthen embankment delivery system which feeds Uncompahgre River and Tunnel water to the west side of the UPA. There are three laterals and one natural stream of importance with regard to the Shavano Falls Hydroelectric site – the CP, CQ and BN Laterals, and Coal Creek.

While the M&D Canal will not be altered, a 1200' long section of the CP Lateral will be enlarged to increase the capacity from 90 cfs to 310 cfs, in order to direct M&D Canal flows to the intake for the hydroelectric facility. Upon enlarging the CP Lateral, soils will be compacted and bentonite applied in order to prevent seepage loss. Finally, a layer of large cobble will be placed over the improved section of the canal to help seal it and prevent erosion.

The CQ Lateral, at the outlet of the powerhouse, will be dug down and enlarged (1,350') to lower the level of the water coming out of the powerhouse. Soils in the area of the CQ Lateral improvement/enlargement are of a different material and do not contribute to seepage losses.

The existing BN Lateral siphon crosses the M&D Canal, the CP Lateral, an existing O&M access road and a private driveway and will have to be relocated. The existing siphon is 50+ years old and deteriorating. The portion proposed for replacement is approximately 0.25 miles in

Figure 2. Shavano Falls Hydroelectric Development - Overall Site Plan

length and will be replaced with new buried PVC pipe. The new pipe will be moved upstream above the Bypass diversion and will cross the M&D Canal and the O&M access road.

Finally, a new diversion will be constructed to direct a portion of the flows from the outlet of the steel penstock to Coal Creek. There are no major construction activities or alterations proposed for Coal Creek.

- Intake

The Intake Structure will be located 1200' downstream of the present CP Lateral diversion point. It will be a new bulkhead structure consisting of two 48" wide sluice gates to continually feed the CP Lateral. Flows in the CP Lateral downstream of the Intake will not be altered, but will be held at more stable flows. A 20' wide concrete feeder canal / intake structure will be utilized to divert flow in the newly enlarged CP Lateral to the steel penstock. A 20' wide roller gate and mechanized trash removal system will be placed in this new section to shut off flows to the hydroelectric facility and to remove debris from the system, respectively. A 69" diameter steel penstock will deliver water to the generation unit in the powerhouse.

- Bypass

During turbine shutdown or startup the automatic electric motor drives on the Bypass roller gate and at the original CP Lateral Diversion and the Intake gate at the penstock will operate at rates to match the turbine wicket gates, i.e. maintain constant upstream water level and thus constant movement of flow, including upstream flow modifications. The Bypass Structure will include two 5' wide Automatic Trip Gates (ATG's) which will function as a redundant safe guard in the event the plant shuts down for any reason and the bypass gate is not able to divert the required flows. In conjunction with the ATG's, a 20' long weir wall will be added at the CP Lateral Diversion to return excess flows to the exiting canal (by-pass).

- Powerhouse

The Powerhouse will be a steel building structure with a reinforced concrete foundation. The foundation will embed the turbine housing and steel draft tube. The building will be approximately 40' wide by 30' long and house the generator and mechanical/electrical auxiliaries. The building will be equipped with a roof access hatch to facilitate future maintenance.

- Turbine

The Turbine will be a horizontal Francis shaft of American/European design built in China. The Turbine manufacturer is represented by Far East Engineering of Boise, Idaho. The Francis Turbine units have been installed in the United States by the Boise Project Board of Control on

Arrow rock Dam, near Boise, Idaho. Similar Francis units were installed on a canal operated by Greensfield Irrigation District on the Turnbull Hydroelectric facility near Fairfield, Montana. Francis units from Far East Engineering were also installed on the Ridgway Dam Hydro Project. Kaplan units from the same manufacturer were installed on the Uncompahgre Project South Canal Drop 1 and Drop 3 Hydroelectric Projects.

- Generator

The Generator is of American/European design and also built in China. It will be a horizontal shaft, three phase AC synchronous generator with a rated capacity of 2800 kW.

- Mechanical Equipment

The turbine wicket gates will operate hydraulically. The hydraulic power unit will be American made – with accumulators for black shutdown. The governor will be digital. The roller gates will be fitted with DC electric power by motor to drive the pinion gears. Level sensors (differential pressure) in the forebay will be utilized to provide information to the powerhouse PLC to maintain constant head in the upstream forebay and thus in the feeder canal. This will also result in level flows being maintained in the CP Lateral.

- Powerhouse Electrical Controls

Powerhouse controls will be utility grade with switchgears backed by 125 volt DC service battery system operation of essential features during power outages, specifically turbine shutdown and maintenance of flow in the canal system including the bypass roller gate. The control panel will be fitted with an automatic telephone dialer to alert of alarm conditions. A dial in signal will allow remote monitoring of the plant including critical variables (bearing temperature, voltage, etc.) from any telephone.

- Substation and Transmission Line

The interconnect will be to Delta Montrose Electric Association (DMEA). The power will then be wheeled to Municipal Energy Association of Nebraska (MEAN). The interconnect location is less than 1 mile east of the Powerhouse and will require 0.9 miles of 12.47 kV overhead line to reach the substation. A switchyard at the Powerhouse will be built with a transformer capable of stepping up the power generated at 4,160 V to the interconnection voltage of 12.47 kV.

- Operation & Maintenance

A partnership has been formed between the UVWUA and Shavano Falls Hydro LLC to design, construct and operate the hydroelectric facility. Shavano Falls Hydro LLC will be responsible for maintenance on the hydroelectric facility for the first 5 years after which time the partnership

will be renegotiated with the UVWUA. Shavano Falls Hydro LLC will not be a signatory to any Reclamation contracts.

- Hydrology

Daily flow data was not available for the area near the proposed hydroelectric facility, therefore a hydrographer was hired to measure daily flows several times throughout the irrigation season. Flows were measured in the CP and CQ Laterals and ¼ mile upstream of the proposed hydroelectric facility site in the M&D Canal. Measured flows were then combined with UVWUA records of the turn-on and shut-off dates for the M&D Canal from 1997 thru 2012. Daily flows going over Shavano Falls were estimated for this 15 year period with extensive input from the UVWUA.

The total number of irrigated acres below the hydroelectric facility has remained constant over the past and is not expected to increase in the future.

D. EVALUATION CRITERIA

V.A.1 Evaluation Criterion A: Water Conservation (28 points)

*Up to **28 points** may be awarded for a proposal that will conserve water and improve efficiency. Points will be allocated to give consideration to projects that are expected to result in significant water savings.*

Subcriterion No. A.1(a)—Quantifiable Water Savings

*Up to **20 points** may be allocated based on the quantifiable water savings expected as a result of the project.*

Not applicable.

Subcriterion No. A.1(b)—Improved Water Management

*Up to **5 points** may be awarded if the proposal will improve water management through measurement, automation, advanced water measurement systems, or through implementation of a renewable energy project, or through other approaches where water savings are not quantifiable.*

Describe the amount of water better managed. For projects that improve water management but which may not result in measurable water savings, **state the amount of water expected to be better managed, in acre-feet per year and as a percentage of the average annual water supply.** (The average annual water supply is the amount actually diverted, pumped, or released from storage, on average, each year. This does not refer to the applicant's total water right or potential water supply.) Please use the following formula: Estimated Amount of Water Better Managed / Average Annual Water Supply

$$\frac{128{,}898 \text{ ac-ft}}{128{,}898 \text{ ac-ft}} = 100\%$$

Due to the implementation of the hydroelectric project, the entire amount of flow in the CQ and CP Laterals and the M&D Canal (310 cfs or 128,898 ac-ft/year) will be better managed as a result of headgate automation and remote monitoring.

SUMMARY OF EXISTING IRRIGATION DELIVERIES: The M&D Canal, near the proposed Shavano Falls Hydroelectric Facility, has historically carried approximately 310 cfs of irrigation water which is then diverted to the CP (90 cfs) and CQ Laterals (130 cfs) with the remainder going to Coal Creek. Coal Creek is a natural stream which is used as a carrier as part of the M&D Canal system for approximately 5 miles. At this point, 70 cfs in Coal Creek is diverted into the Lower M&D/C Canal system and 20 cfs stays in Coal Creek. Coal Creek then merges with Dry Creek and is used to feed the Ironstone (F) System.

M&D CANAL: The M&D Canal (above the hydroelectric facility) carries approximately 128,898 ac-ft of water per year (15 year average 1997-2012) to the CP and CQ Laterals and Coal Creek. The lower M&D Canal provides irrigation water to 5,700 irrigated acres and 180 users. The M&D Canal from the Uncompahgre River diversion to the point where it exits to the Ironstone Canal is approximately 31.4 miles in length.

CP LATERAL: The CP Lateral delivers approximately 37,422 ac-ft/year of water to 165 water users on 4,800 irrigated acres on the west side of the UPA. The CP Lateral is 9.64 miles in length (50,900 ft).

CQ LATERAL: The CQ Lateral delivers approximately 54,054 ac-ft/year of water to 150 users on 7,800 acres on the west side of the UPA. The CQ Lateral is 20.72 miles in length (109,390 ft).

COAL CREEK: Coal Creek serves as a carrier for the M&D Canal system for approximately 5 miles (26,400 ft) after which 20 cfs remains in Coal Creek and the remaining 70 cfs is diverted to the Lower M&D/C Canal system. There are no diversions off Coal Creek in the 5 miles reach in which it serves as a carrier for the M&D Canal.

BN SIPHON: The existing siphon (off the BN Lateral) near the proposed hydroelectric facility, is a 16" steel siphon and carries approximately 13.5 cfs. The BN siphon delivers to approximately 5,670 ac-ft/year of water to 4 users on 675.5 acres on the west side of the UPA. The BN siphon is 0.3 miles in length (1900 ft).

DESCRIPTION OF THE WATER BETTER MANAGED:

- ***This project will improve irrigation water management (Task A) through implementation of headgate automation, measurement, and remote monitoring*** associated with hydroelectric renewable energy development. New canal headgate structures and sensors installed above the Intake and the new CP diversion headgate (near the Intake) will automatically control canal water levels. Improved irrigation water management will result from improved canal control and more stable and reliable delivery of irrigation water to users who have typically had to deal with the effects of "bounces" in the irrigation delivery system. The historical irrigation diversion structures/headgates at the current CP and CQ Lateral diversion points are 100+ and 70+ years old, respectively. Because of the age of the structures, the UVWUA has not been able to accurately measure water diversions. New

automated headgates and submersible level sensors will allow for accurate accounting of water deliveries. The hydroelectric facility and canal flows will eventually be remotely monitored at the UVWUA headquarters. Finally, more stable water levels in the M&D Canal and more reliable deliveries in the CQ Lateral should result in reduced selenium loading due to improved irrigation water management in areas with high selenium soil mobilization potential (e.g. California Mesa).

- ***This project will make more water available to downstream UPA water users and eliminate salt loading to the Colorado River (Task A).*** Placing open, earthen laterals in closed *pipe* (e.g. 1,760 ft of steel penstock and 1,320 ft of BN Lateral), *lining* earthen canals (e.g. 1,200 ft section of CP Lateral) and *eliminating flows* in a portion of the M&D Canal (2,640 ft) and the CQ Lateral (800 ft) will prevent approximately 3,772 ac-ft/year of delivery system water loss due to leakage. It will also prevent approximately 411 tons/year of salt from entering the Colorado River system.

- **Incorporating two new *trash screens* at the Bypass structure and the Intake will result in better on-farm irrigation water management (Task A)** due to the delivery of cleaner and more reliable water supplies and greater canal control. Trash screens improve canal control and prevent unnecessary system losses due to canal overflow.

A new trash rack with 4-8 inch spacing will be placed at the head of the new, enlarged and lined CP Lateral in order to screen big trash items such as logs, etc. In addition, there will be a second automated, self-cleaning trash screen at the Intake structure immediately upstream of the penstock for screening smaller debris. Historically trash has been a problem especially for water users on the CP Lateral. The new trash screens will have significant benefits including minimizing canal overflow and providing clean water, enabling more reliable water deliveries.

Subcriterion No. A.2—Percentage of Total Supply

*Up to **4 additional points** may be allocated based on the percentage of the applicant's total average water supply (i.e., including all facilities managed by the applicant) that will be conserved directly as a result of the project.*

Not applicable.

Subcriterion No. A.3—Reasonableness of Costs

*Up to **4 additional points** may be awarded based on the reasonableness of the cost for the benefits gained.*

Please include information related to the total project cost, annual acre-feet conserved (or better managed), and the expected life of the improvement. Use the following calculation:

$$\frac{\text{Total Project Cost}}{\text{(Acre-Feet Conserved, or Better Managed x Improvement Life)}}$$

$$\frac{\$7,807,303.40}{\text{(128,898 ac-ft x 100 years)}}$$

= $0.61/ac-ft/year

The U.S. Department of Energy estimates the average life-expectancy of a hydroelectric facility at 100 years (Energy Efficiency and Renewable Energy, July 2004).

V.A.2 Evaluation Criterion B: Energy-Water Nexus (16 points)

For projects that include construction or installation of renewable energy components, please respond to Subcriterion No. B.1— Implementing Renewable Energy Projects Related to Water Management and Delivery.

Subcriterion No. B.1—Implementing Renewable Energy Projects Related to Water Management and Delivery

It is readily apparent in many areas of the Department of Interior that the development of renewable energy generation is a core component of Reclamation's mission and long-term strategic objective as demonstrated below. For example:

- The Department of Interior's Strategic Plan for 2011-2016 points to the development of "renewable energy potential as a strategy supporting the Department's goal of securing America's energy resources."

- The 2010 Sustainable Hydropower Memorandum of Understanding (MOU) outlines and promotes shared goals for the development of clean, reliable, cost-effective, and sustainable hydropower generation in the United States. The MOU outlines the challenge for Reclamation and other signatories to identify, "new ways to develop clean, renewable hydropower energy that not only increases energy generation capacity, but also leads to improvements in ecosystem function and health". This project addresses that challenge and demonstrates the multiple benefits associated with hydropower development in the UPA including benefits to endangered species and water-quality improvements (salt control and selenium reduction potential).

- In March of 2011, Reclamation released a report entitled, "Hydropower Resource Assessment at Existing Reclamation Facilities." The report provided a reconnaissance level evaluation of hydropower development potential at Reclamation facilities. A total of 70 sites showed some economic potential for hydropower development. Of the 70 sites identified, 10 are in the federal Uncompahgre Project including the Shavano Falls Site on the M&D Canal (http://www.usbr.gov/power/AssessmentReport/index.html).

- In March 2012 a more detailed supplement report was released entitled, "Site Inventory and Hydropower Energy Assessment of Reclamation Owned Conduits." Table 3 and 4 in that report rank the top 25 sites based upon their energy production potential and installed capacity, respectively. Shavano Falls ranked #1 for both energy production and installed capacity potential (http://www.usbr.gov/power/CanalReport/FinalReportMarch2012.pdf).

- Finally, Reclamation has developed six long-term strategic objectives to further Reclamation's sustainable energy mission including *Strategic Objective #1 - Increase*

Renewable Energy Generation from Reclamation Projects. On-going Reclamation activities in support of the objective specifically include the use of WaterSMART grants to "provide cost-share assistance to support the development of renewable resources" (http://www.usbr.gov/power/Reclamation%20Sustainable%20Energy%20Energy%20Strategy%20.pdf).

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

The Shavano Falls Hydroelectric Facility will be constructed at an existing irrigation canal drop known as Shavano Falls. The existing drop carries approximately 220 cfs of water and gradually drops a vertical distance of 184 feet. A hydroelectric facility will be constructed to capture this previously unutilized renewable energy. The energy capacity of the proposed facility is 2,800 kW (2.8 MW) (Figure 3). The facility will utilize a Francis turbine connected to a horizontal shaft three phase AC synchronous generator.

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

Sorenson Engineering estimates an average annual energy generation of 12,973,000 kWHr per year at the Shavano Falls Hydroelectric Facility (Figure 3). The energy generation estimate was derived by Sorenson Engineering by modeling estimated daily flows received from the UVWUA and verifying those flows with several on-site flow measurements. Canal turn-on and shut-off dates over the past 15 years (1997-2012) were used to produce annual generation. Friction losses, k-losses, turbine efficiency and generator efficiency were used in the calculations.

Approximately 220 cfs in the M&D Canal will be directed to the Intake structure. The water will then flow through 1,760 feet of steel penstock pipe and fall 184 feet to the hydroelectric facility. It will then be placed back into the irrigation delivery system with no interruption to water users. If for some reason the facility is down and unable to pass water, the existing canal system will be left in place and serve as a by-pass so that irrigation will never be interrupted.

The substation and interconnect will be to Delta Montrose Electric Association (DMEA) which will then be wheeled to the Municipal Energy Association of Nebraska (MEAN). The interconnection is located 0.9 miles east of the powerhouse and will require a 12.47 kV overhead line to reach the station. A switchyard constructed at the powerhouse will step up the power generated at 4,160 V to the interconnection voltage of 12.47 kV.

Figure 3. Shavano Falls Hydro Power Generation

Shavano Hydro Energy in Megawatt Hours

Total Generation Per Month

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Total Megawatt Hours	
1997	-	-	-	1,239	2,053	1,987	2,053	2,053	1,987	1,557	-	-	1997	12,761
1998	-	-	-	1,230	2,053	1,987	2,053	2,053	1,987	1,557	-	-	1998	12,753
1999	-	-	-	596	2,053	1,987	2,053	2,053	1,987	1,557	-	-	1999	12,127
2000	-	-	501	1,733	2,053	1,987	2,053	2,053	1,987	1,557	-	-	2000	13,743
2001	-	-	-	1,589	2,053	1,987	2,053	2,053	1,987	1,888	-	-	2001	13,433
2002	-	-	108	1,786	2,053	1,987	2,053	2,053	1,987	1,226	-	-	2002	13,081
2003	-	-	-	1,470	2,053	1,987	2,053	2,053	1,987	1,358	-	-	2003	12,793
2004	-	-	-	1,575	2,053	1,987	2,053	2,053	1,987	1,756	-	-	2004	13,289
2005	-	-	-	1,272	2,053	1,987	2,053	2,053	1,987	1,822	-	-	2005	13,055
2006	-	-	-	1,311	2,053	1,987	2,053	2,053	1,987	1,689	-	-	2006	12,963
2007	-	-	-	1,137	2,053	1,987	2,053	2,053	1,987	1,756	-	-	2007	12,857
2008	-	-	-	1,270	2,053	1,987	2,053	2,053	1,987	1,689	-	-	2008	12,923
2009	-	-	-	1,322	2,053	1,987	2,053	2,053	1,987	1,888	-	-	2009	13,171
2010	-	-	-	1,601	2,053	1,987	2,053	2,053	1,987	1,756	-	-	2010	13,315
2011	-	-	-	1,457	2,053	1,987	2,053	2,053	1,987	1,425	-	-	2011	12,846
2012	-	-	108	1,548	2,053	1,987	2,053	2,053	1,987	829	-	-	2012	12,453
Average	-	-	41	1,373	2,053	1,987	2,053	2,053	1,987	1,632	-	-		

Shavano Hydro Energy in Megawatt Hours

*Daily Data was not available, daily data was approximated using several measured flows and extensive input from the Water Users

Yearly Average MW-hours
12,973

Describe any other benefits of the renewable energy project. Please describe and provide sufficient detail on any additional benefits expected to result from the renewable energy project, including:

- Expected environmental benefits of the renewable energy system

Environmental Benefit #1: ***Clean energy*** generated from the Shavano Falls Hydropower facility can replace energy generated from fossil fuel or coal. The Shavano Falls site is an ideal location to ***"increase the use of renewable and clean energy sources in the management and delivery of water" in the Uncompahgre Project (Task B).*** According to the U.S. Energy Information Administration (EIA), in 2011 "the average annual electricity consumption for a U.S. residential utility customer was 11,280 kWh..." (http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3).

With an average annual energy generation of 12,973,000 kWHr, the Shavano Falls Hydroelectric Facility would provide enough clean energy to power 1,150 homes each year. This would also result in the removal of an estimated 27,000,000 – 28,000,000 lbs of CO_2 per year depending upon the specific fuel and specific type of generator. Table 1 below has been modified to demonstrate the number of pounds of CO_2 that could be removed annually for the average U.S. household utilizing steam-electric generators in 2011 for the specific fuels identified (http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11).

Table 1. Shavano Falls Hydroelectric Development: Associated Carbon Reduction

Fuel	Lbs of CO_2 per Million Btu	Heat Rate (Btu per kWh)	Lbs CO_2 per kWh	Lbs of CO2 removed when using clean energy
Coal				
Bituminous	205.300	10,128	2.08	26,983,840
Sub-bituminous	212.700	10,128	2.15	27,891,950
Lignite	215.400	10,128	2.18	28,281,140

Last updated: June 13, 2013 (http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11)

Environmental Benefit #2: Lining, piping, realignment/elimination of flows in leaking canals/laterals, automation and trash screens will have significant benefits toward ***improved water management (Task A)*** and is consistent with system optimization planning and implementation efforts occurring throughout the UPA for water-quality and water resource benefits (selenium and salinity reduction from irrigation delivery conveyance systems in the UPA).

Leaking canals and laterals in the UPA delivery system load selenium and salinity to the Colorado River. Piping and lining activities associated with this hydroelectric development project will result in the elimination of 3,722 ac-ft/year of delivery system water loss and 411 tons/year of salt controlled. Seepage losses were calculated utilizing seepage and salt loading

estimates developed by Reclamation for the UPA. According to the Reclamation, seepage and salt loading estimates were based upon "the 1982 Lower Gunnison Basin Unit Hydrosalinity Model and Coll Stanton's work for the 1995 preconstruction report" (personal communication, Reclamation). Seepage losses and salt load reduction associated with the hydroelectric project are summarized below in Table 2. Note: Official Reclamation Seepage Estimates for the Uncompahgre Project are confidential and can be made available upon request.

Table 2. Shavano Falls Hydroelectric Power Development: Seepage & Salt Reduction

Delivery System Identification	Total Length (ft)	Annual Seepage (ac-ft)	Annual Salt Loading (tons)	Annual Salt Loading (tons/mi)	Length Section Improved (ft)	Length Section Eliminated (ft)	Annual Seepage Eliminated (ac-ft)	Annual Salt Removed (tons)
CQ Lateral	109,390	2,555	5,441	263		800	387.12	39.85
M&D - section with existing flow eliminated	165,790	5,566	11,855	378		2,640	1,277.50	189.00
M&D Canal - Shavano Falls section only (i.e. penstock)	165,790	5566	11,855	378	1,760		1,855.33	126.00
CP Lateral	50,900	1,076	2,292	238	1,200		244.55	54.09
BN Lateral - Siphon	36,170	605	1,289	188	1,320		7.56	2.35
						Total:	**3,772.06**	**411.29**

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

  No.

- Anticipated beneficiaries, other than the applicant, of the renewable energy system.

  According to MEAN (Municipal Energy Association of Nebraska), transmission line loss is avoided when outside energy does not have to be brought in to an area. Energy generated by the Shavano Falls Hydropower Development Project will be provided locally to the City of Delta, Colorado.

  Future revenues derived from the power plant will off-set operation and maintenance costs throughout the entire UPA.

- Expected water needs of the renewable energy system

  Hydro power generation is a non-consumptive use so there are no water needs associated with the project.

V.A.3 Evaluation Criterion C: Benefits to Endangered Species (12 points)

For projects that will directly benefit *federally-recognized candidate species*, please include the following elements:

(1) What is the relationship of the species to water supply?

The federal UPA receives its water supply from the Gunnison River via the Gunnison Tunnel below the federal Aspinall Unit and the Uncompahgre River. The lower Gunnison (below the confluence of the Uncompahgre River) and the Colorado Rivers, serves as critical habitat to four listed endangered fish species (razorback sucker, humpback chub, bonytail chub, and Colorado pikeminnow).

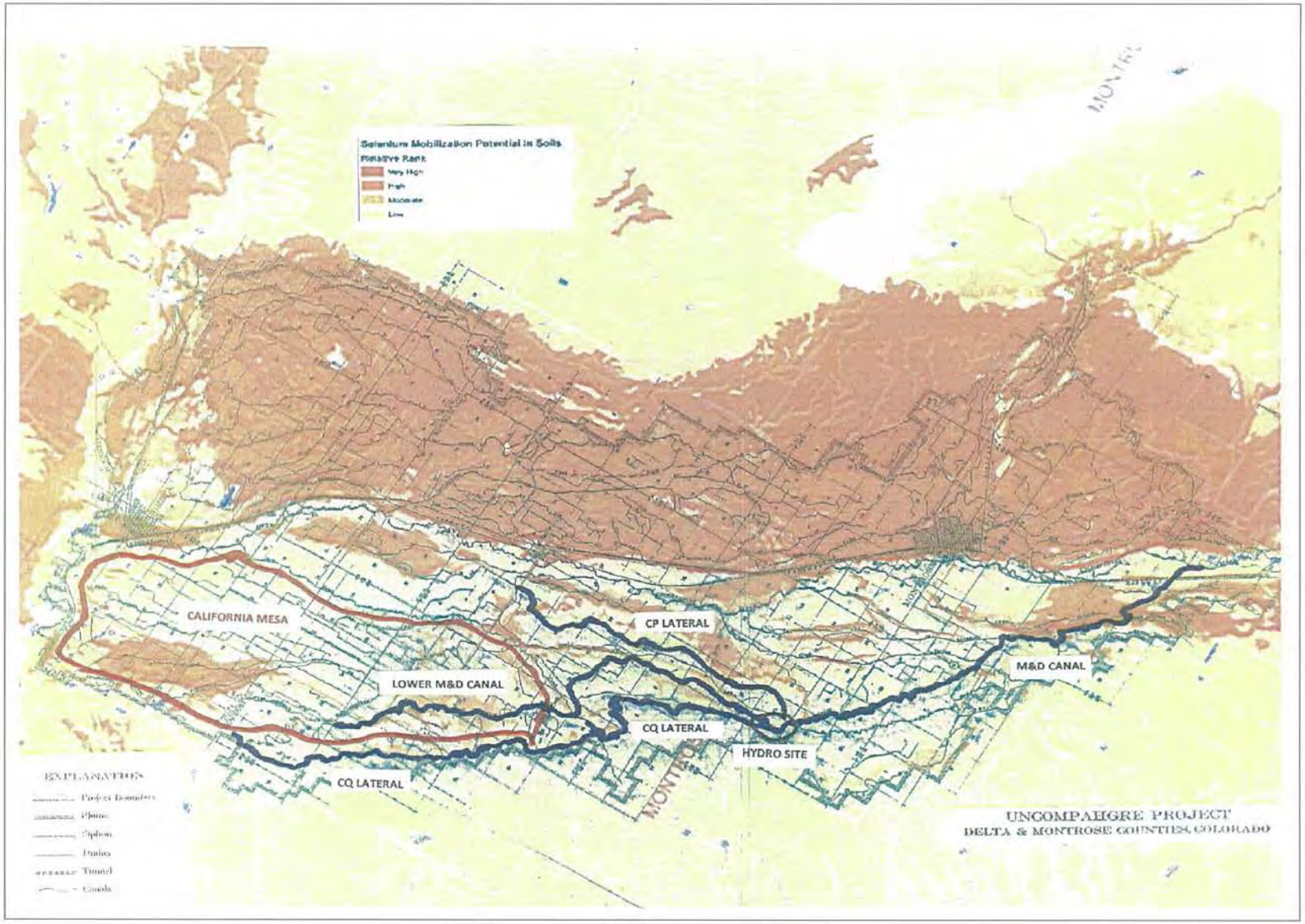
(2) What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

Headgate automation, remote monitoring and SCADA implemented as part of this hydroelectric development project will have significant benefits on accelerating the recovery of endangered fish species in the Lower Gunnison and Colorado Rivers by:

a) *Improved Irrigation Water Management*: Headgate automation will regulate flows in the CQ and CP Laterals and the M&D Canal which will lead to improved irrigation water management. By providing stable and reliable water supplies, farmers can eliminate the need to re-start irrigation sets due to frequent "bounces" in the delivery system. This is especially important in certain areas on the west side of the UPA with high selenium soil mobilization potential, such as California Mesa, where the CQ Lateral and lower M&D Canal provide water to approximately a third of the irrigated acreage on California Mesa (4,500 of the total 13,500 acres) (Figure 4). By improving irrigation water management, on-farm seepage and resultant selenium loading may be reduced.

b) *Benefits to Aspinall Unit Re-operations for Endangered Species*: Headgate automation and remote monitoring associated with the proposed hydroelectric facility may make the operation of the Aspinall Unit easier for the benefit of endangered species because it allows the UVWUA to have better control of water going through the UPA. This project increases the resiliency of the UVWUA and Reclamation should they have to respond to a potential water and endangered species conflict in an area of the western United States prone to frequent and prolonged droughts. System optimization planning and implementation is currently in progress with the goals of improving delivery system operations while reducing selenium and salinity loading to the lower Gunnison and Colorado Rivers which serve as critical habitat to endangered fish species.

Figure 4. Selenium soil mobilization potential map – California Mesa, Uncompahgre Project



For projects that will directly accelerate the recovery of *threatened or endangered species or address designated critical habitats*, please include the following elements:

(1) How is the species adversely affected by a Reclamation project?

The application of water to natural geologic sources of Mancos Shale derived soils via the application of irrigation water to urban landscaping or agricultural fields and the leaking of canals or laterals, mobilizes selenium and salts and creates hydraulic gradients that can result in the discharge of non-point source polluted surface and groundwater into irrigation drains and local waterways.

High selenium concentrations have been shown to cause reproductive failure and deformities in aquatic birds and fish. The lower Gunnison (from the confluence of the Uncompahgre River) and Colorado Rivers, serves as critical habitat to four listed endangered fish species (razorback sucker, humpback chub, bonytail chub, and Colorado pikeminnow). The federal Uncompahgre Project Area and the Uncompahgre River Basin have been identified as the source of 60% of the selenium loading in the lower Gunnison River (Reclamation, 2006). The Uncompahgre River currently violates Clean Water Act (CWA) chronic water-quality standards of 4.6 ppb which are said to be protective of aquatic dependent life. Selenium concentrations in the Uncompahgre River above the confluence with the Gunnison are 14.8 ppb.

In 2009, an Environmental Impact Statement (EIS) was prepared for re-operation of the Aspinall Unit to mitigate for the effects of depletions in the Gunnison and Dolores River Basins on endangered river fish. A Biological Assessment (BA) found that there would be impacts to endangered fish as a result of the proposed re-operation. The FWS prepared a Programmatic Biological Opinion (PBO) which stated that on-going irrigation activities in the Lower Gunnison would continue to negatively impact selenium levels and that a Selenium Management Program (SMP) would have to be developed as part of the conservation measures utilized to mitigate impacts from the flow modifications and historical depletions.

Mancos Shale derived soils are found mainly on the east side of the UPA (east of the Uncompahgre River) and to a lesser extent on the west side of the UPA (west of the Uncompahgre River). One such area of concern on the west side among SMP stakeholders is California Mesa. California Mesa is one of three major terrace surfaces underlain by Mancos Shale soils. The CQ Lateral provides irrigation water to approximately one third of the irrigated acres on California Mesa (2,600 acres). Projects that enable better on-farm irrigation water management (e.g. headgate automation) by creating more reliable and stable water supplies in delivery systems serving high selenium soil mobilization areas, may result in reductions in deep percolation and therefore selenium loading to the Gunnison and Colorado Rivers. These two rivers serve as critical habitat to four endangered fish species.

Note: The proposed Shavano Falls Hydroelectric Facility and associated structures are not located in high selenium soils.

(2) Is the species subject to a recovery plan or conservation plan under the Endangered Species Act?

Yes. The Colorado River Endangered Fish Recovery Program.

(3) What is the extent to which the proposed project would reduce the likelihood of listing or would otherwise improve the status of the species?

This project will have significant benefits toward improving the status of endangered species. Benefits include improved water management due to more reliable irrigation deliveries through the CQ Lateral and the M&D Canal which serve areas with high selenium soil mobilization potential; and improved control of water flowing through the UPA as a result of Aspinall Unit Re-operations for the benefit of endangered species. Most importantly, benefits are significant because it greatly increases the resiliency of the UVWUA and Reclamation to respond to a potential water and endangered species conflict in an area susceptible to prolonged and severe drought.

The UVWUA is working closely with Reclamation and other SMP stakeholders to conduct a comprehensive System Optimization Study primarily focused on selenium and salinity control benefits on the east side of the UPA. While most of the planning efforts are focused on the east side, recent modifications to the scope of work have targeted automation efforts on the west side of the UPA and incorporate hydroelectric energy development into the analyses. In addition, the presence of several areas on the west side with high selenium soil mobilization potential is also a concern. This project ties closely with those implementation efforts, especially as it relates to automation and remote monitoring and the ability to control water moving throughout the UPA for the benefit of endangered species.

V.A.4 Evaluation Criterion D: Water Marketing (12 points)

Not applicable.

V.A.5 Evaluation Criterion E: Other Contributions to Water Supply Sustainability (14 points)

(1) Points may be awarded for projects that address an adaptation strategy identified in a completed ***WaterSMART Basin Study****.*

(a) Identify the specific WaterSMART Basin Study where this adaptation strategy was developed. Describe in detail the adaptation strategy that will be implemented through this WaterSMART Grant project, and how the proposed WaterSMART Grant project would help implement the adaptation strategy.

- According to the 2012 *Colorado River Basin Water Supply and Demand Study*, all portfolios developed to address water supply and demand imbalances involved adaptation strategies with "significant agricultural water conservation". Implementation activities associated with this hydroelectric project indirectly address the adaptation strategy for

Conveyance System Efficiency Improvements identified in Technical Report F (Appendix F10) and prevent 3,772 ac-ft/year of delivery system loss.

According to the report, "Improvements in conveyance system efficiency through ***delivery canal lining, canal to pipe conversion***, ***improved canal control*** and/or construction of regulating reservoirs to reduce canal operational spills, and implementation of system-wide drainwater or tailwater recovery systems ***are included in this option***" (emphasis added).

The following irrigation lateral and canal conveyance system improvements associated with the proposed hydropower project will help implement the Conveyance System Efficiency Improvement adaptation strategy as follows:

1) ***Lining*** of the CP Lateral will result in the reduction/elimination of approximately 245 ac-ft per year of seepage loss associated with the existing unlined, open, earthen CP Lateral;
2) Directing M&D Canal flows to the 1,760' of steel ***penstock pipe*** in order to generate hydropower over Shavano Falls will result in the elimination of 1,855 ac-ft/year of seepage loss historically associated with the M&D Canal below the CP Lateral diversion point;
3) ***Headgate automation, remote monitoring and trash screens*** associated with the hydroelectric facility greatly improve canal control and irrigation delivery system efficiency by creating clean, stable and reliable flows which often result in improved on-farm irrigation water management and reductions in delivery system water loss due to canal spills; and
4) Replacement of the 100+ and 75+ year old diversion structures at the CP and CQ Laterals, respectively, will allow more accurate ***measurement*** of water deliveries.

•A specific adaptation strategy could not be found in the Basin Study that relates to the need to develop *new* hydropower to reduce our energy demands on oil shale development.

Appendix F12 - **Option Characterization for System Operations** discusses the effect of *Option 4 - Modifying Operations of Existing Reservoirs* to decrease demand, reduce evaporation loss, and improve efficiency with the Basin. Several sub-options were identified including sub-option 4.3 – **Maximize Hydropower Generation.** This option is focused on improving power generation efficiency at existing reservoirs in the basin that do not operate at optimal capacity. The option does not explore the benefits of new hydropower development at federally owned facilities such as conduits.

(b) Describe how the adaptation strategy and proposed WaterSMART Grant project will address the imbalance between water supply and demand identified by the Basin Study.

The lining and piping conveyance system efficiency improvements described above result in the reduction/elimination of system water losses associated with an existing open, earthen delivery system that leaks. This water can now be made available to water users further downstream in the UPA who are most impacted during periods of dry hydrologic conditions.

Headgate automation, remote monitoring and trash screens will reduce operational spills thus keeping water in the system to meet on-going demands. Automation and monitoring of the conveyance system also means that "bounces" in the delivery system will be eliminated, canal control will improve, and reliable and stable water supplies will result in better on-farm irrigation water management. It also increases the UVWUA's ability to control water going through the UPA for environmental concerns (Clean Water Act and Endangered Species Act).

(c) Identify the applicant's level of involvement in the Basin Study (e.g., cost-share partner, participating stakeholder, etc.).

The UVWUA was a participating stakeholder and worked with Reclamation staff to provide input, data and information relevant to the Colorado River Basin Water Supply and Demand Study.

(d) Describe whether the project will result in further collaboration among Basin Study partners.

The Shavano Falls Hydropower Development Project has resulted in significant collaboration among Basin Study partners.

Over the past 16 months, the UVWUA has been working closely with the Colorado River Water Conservation District, the U.S. Bureau of Reclamation Grand Junction, Gunnison Basin Selenium Task Force and Gunnison Basin Selenium Management Program stakeholders to conduct an Uncompahgre Project System Optimization Study. The purpose of the study is to perform a comprehensive analysis of efficiency improvement opportunities in the UPA (mainly on the east side with a few areas on the west side) that minimize water losses to deep percolation in order to reduce selenium and salinity loading while also integrating the off-farm delivery system with on- and near-farm irrigation efficiency improvements. This comprehensive study takes into account existing and potential hydropower development sites in the UPA while also addressing operational issues associated with a modernized delivery system including a comprehensive assessment of canal control via automation, remote monitoring and SCADA, and regulating reservoirs, for example.

The UVWUA works with multiple stakeholder groups to evaluate and address water supply and demand issues. For example, the UVWUA has worked with the Colorado Water Conservation Board and the Colorado Department of Agriculture Basin States Program to implement a canal lining demonstration project for water conservation, and selenium and salinity reduction benefits. The UVWUA regularly participates in Gunnison Basin Roundtable meetings and the Inter-Basin Compact Committee focused on evaluating and addressing issues associated with water supply and demand in the Gunnison Basin and the 7 Colorado River Basin states.

(2) Points may be awarded for projects that describe in detail how they will directly expedite future ***on-farm irrigation improvements****, including future on-farm improvements that may be eligible for NRCS funding. Please address the following:*

Not directly explored.

(3) Points may be awarded for projects that include ***other benefits*** *to water supply sustainability.* Additional project benefits may include, but are not limited to, the following:

(a) Will the project make water available to address a specific concern? For example:

(i) Will the project address water supply shortages due to climate variability and/or heightened competition for finite water supplies (e.g., population growth or drought)? Is the river, aquifer or other source of supply over-allocated?

There is disagreement at this time as to whether the Gunnison Basin, a sub-basin of the Colorado River Basin, is over or under allocated at this time. The Colorado River Basin is over-allocated.

Yes, this project will help to address heightened competition for water supplies. Over the past 15 years, the Lower Gunnison Basin has experienced several intense droughts, the last occurring in 2012. The Uncompahgre River water right usually results in a call being placed on the Uncompahgre River every 6 out of 10 years. During 2002 and 2003, the UVWUA was running at or below 80% of their allocation which resulted in calls being placed on junior water-right holders on the Gunnison River which has happened only twice in the past 38 years. During the drought of 2012 an agreement was made between the UVWUA and the Upper Gunnison River Basin with second fill storage credits out of Taylor Reservoir thus averting having to place a call on the Gunnison River.

The canal automation and remote monitoring aspects associated with this hydropower project directly respond to climate variability and competition for finite water supplies by improving the UVWUA's ability to accurately measure deliveries, keep steady water supplies in the system, and prevent canal spills at the canal headgates. It also improves the resiliency of the UVWUA and Reclamation to respond to potential CWA and ESA issues by providing better control of water moving through the UPA.

The piping and lining aspects associated with this hydropower project also respond to competition for finite water supplies by eliminating delivery system losses to leakage and providing additional water to downstream UPA users during times of drought.

The UVWUA and other stakeholders within the basin are concerned about the potential for water resource, water-quality and endangered species conflicts that may arise as a result of climate change and projected population growth within areas served by the Colorado River in the Colorado River Basin, State of Colorado, and Delta and Montrose Counties.

(ii) Will the project market water to other users? If so, what is the significance of this (e.g., does this help stretch water supplies in a water-short basin)?

Not applicable.

(iii) Will the project make additional water available for Indian tribes?

No.

(iv) Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved? (e.g., will the project benefit an endangered species by maintaining an adequate water supply)? Are there endangered species within the basin or other factors that may lead to heightened competition for available water supplies among multiple water uses?

Canal headgate automation and remote monitoring associated with the hydroelectric project will make the operation of the Aspinall Unit easier for the benefit of endangered species occupying critical habitat in the lower Gunnison and Colorado Rivers because the UVWUA will have better control of water going through the UPA. Automation and remote monitoring may provide significant benefits in an area experiencing prolonged drought.

(v) Will the project generally make more water available in the water basin where the proposed work is located?

Yes, the project will make more water available that was previously being lost from the delivery system due to leakage. Lining, piping, and the elimination of flows in the CP and CQ Laterals and the M&D Canal will result in an additional 3,772 ac-ft/year of water available to downstream UPA water users.

(b) Does the project promote and encourage collaboration among parties?
(i) Is there widespread support for the project?

Yes.

(ii) What is the significance of the collaboration/support?

There is widespread support for the Shavano Falls Hydroelectric Project. The stakeholders of the Gunnison Basin Selenium Management Program have encouraged on-going system optimization efforts occurring throughout the UPA because of the benefits it provides to water quality and water resource improvement efforts (e.g. better on-farm irrigation water management, less deep percolation which results in selenium and salt loading).

Uncompahgre Project water users strongly support renewable energy development and on-going system optimization efforts as evidenced by the attached Board Resolution. The community has shown a strong interest in renewable energy development as there are frequent requests for public presentation and tours to existing hydro sites.

The Municipal Electric Association of Nebraska (MEAN) supports the development of local sources of renewable energy to communities because of the efficiency.

The Colorado Small Hydro Association (COSHA) promotes the development of small hydro power in Colorado.

Colorado Congressman Scott Tipton has been a champion of the development of small hydro hydroelectric projects and sponsored H.R. 678 which will help lead to job creation in Colorado.

(iii) Will the project help to prevent a water-related crisis or conflict?

Yes, the project will help to prevent water-related crisis due to shortages of water supply during times of drought by:

•Making more water available in the delivery system through associated piping and lining and the elimination of flows in portions of the laterals and canals which prevents seepage losses (3,772 ac-ft); and

•Improving control of water flowing through the UPA from Aspinall Unit re-operations for the benefit of endangered fish species occupying the lower Gunnison and Colorado Rivers.

(iv) Is there frequently tension or litigation over water in the basin?

Yes, there is frequent tension over calls placed on junior water right holders in water short years. There is also fear of over-allocation of water throughout the state and western Colorado especially during periods of drought.

(v) Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?

Yes. This project may result in improved irrigation water management for water users served by the CQ and CP Laterals and the lower M&D Canal due to headgate automation which creates reliable and stable canal/lateral levels and water deliveries.

(c) Will the project increase awareness of water and/or energy conservation and efficiency efforts?

(i) Will the project serve as an example of water and/or energy conservation and efficiency within a community?

Yes. This project will serve as an example of how system optimization and hydropower development can result in a local source of clean and renewable energy while also addressing water-resource and water-quality concerns. The Shavano Falls Hydropower Development Project is also important in that the power generated at the Falls will serve the City of Delta, a local community.

The UVWUA has received significant attention and/or support at local, regional, state and national levels with regard to their prior small-scale hydropower projects at Drops 1 and 3 and for the current Shavano Falls project.

In addition, the UVWUA has significant support from other stakeholders due to their pro-active approach to addressing local water-quality, water resource and endangered species concerns.

(ii) Will the project increase the capability of future water conservation or energy efficiency efforts for use by others?

Yes, the project will increase the capability of future water conservation or energy efficiency efforts by others through on-going education and outreach. The UVWUA has hosted many tours and given numerous presentations to diverse individuals and organizations related to their efforts at generating hydropower and their efforts at optimizing and modernizing their irrigation delivery system in order to address water-resource, water-quality, and endangered species concerns.

(iii) Does the project integrate water and energy components?

Yes. This project integrates small scale hydroelectric power development with conveyance system improvements on an existing irrigation delivery system in the UPA.

V.A.6 Evaluation Criterion F: Implementation and Results (10 points)

*Up to **10 points** may be awarded for the following:*

Subcriterion No. F.1—Project Planning

Points may be awarded for proposals with planning efforts that provide support for the proposed project.

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

A) UPA Water Management Plan (2014)
B) UPA System Optimization Review
C) Gunnison Basin Selenium Management Program Formulation Document (SMP)
D) Gunnison Basin & Grand Valley Selenium Watershed Management Plan (SeWMP)
E) Reclamation's Sustainable Energy Mission
F) President's Climate Action Plan 2013
G) Reclamation's 2011-2016 Strategic Plan

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

•A feasibility report for the 2,800 kW Shavano Falls Hydroelectric Development project was completed on November 14th, 2013, by Sorenson Engineering. A copy can be made available upon request.

Sorenson Engineering has completed design drawings for the: project location, civil site plan, penstock plan and profile, CP Lateral diversion/bypass, intake structure, bypass trip gate design, powerhouse turbine bay floor plan, powerhouse main level floor plan, powerhouse elevation view, CQ diversion box, CP Lateral enlargement, CQ Lateral dig down, and penstock pier design.

•A hydrographer was hired to measure canal and lateral flows in support of the hydropower generation analyses and projections.

Sorenson Engineering started engineering design activities in August of 2013. Final design and engineering are expected by March of 2014. A copy of final plans can be provided upon request.

(3) 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).

UPA WATER MANAGEMENT PLAN (WMP): The UVWUA certifies that it has an up-to-date WMP. The plan has been submitted to Ms. Sandra Caskey of the Western Colorado Area Office in Grand Junction. Ms. Caskey can be contacted directly if verification is needed (Phone: 970-248-0616 or Email: scaskey@usbr.gov). This project addresses water management goals and objectives identified in the UP WMP including: 1) continuing to develop hydropower in the Uncompahgre Project where feasible, 2) implementing headgate automation for improving water delivery and administration on the M&D Canal, and 3) piping lateral and lining canals on the east and west side of the UP.

UPA SYSTEM OPTIMIZATION REVIEW (SOR): The UVWUA certifies that an *Integrated Assessment and System Optimization Analysis* or SOR is currently in progress. The study is being conducted by the Irrigation Training and Research Center at California Polytechnical. A final report is expected in 2014. The SOR analyses directly support conveyance system optimization and efficiency, canal control and small-scale hydropower development. Initially, all of the analyses were directed to the east side of the UPA, but a modified SOW has been approved which incorporates additional analyses to provide for a comprehensive review and final recommendations for headgate automation, remote monitoring and SCADA / alarming capabilities throughout the entire UPA.

SELENIUM MANAGEMENT PROGRAM FORMULATION DOCUMENT (SMP): A SMP Formulation Document was completed for the Gunnison Basin in December 2011. The SMP directly supports on-going conveyance system improvements and improved irrigation water management in order to reduce selenium loading throughout the Gunnison Basin. The SMP document can be accessed through Reclamation's website at:

http://www.usbr.gov/uc/wcao/progact/smp/docs/Final-SMP-ProgForm.pdf.

GUNNISON BASIN & GRAND VALLEY SELENIUM WATERSHED MANAGEMENT PLAN (SeWMP): The SeWMP was completed by the Selenium Task Force (STF) in December 2012. Specific areas for remediation are being targeted by the STF through on-going water-quality monitoring programs, sub-basin model analyses, and supporting soils data. Areas of concern include those areas identified in the UPA with high to very high selenium soil mobilization potential. The SeWMP can be accessed via the Selenium Task Force website at:

http://www.seleniumtaskforce.org/images/LG_GV_Se_Watershed_Plan_Final_v.12-19-12.pdf

RECLAMATION'S SUSTAINABLE ENERGY MISSION: Reclamation has developed six long-term strategic objectives to further Reclamation's Sustainable Energy Mission including *Strategic Objective #1 - Increase Renewable Energy Generation from Reclamation Projects.* On-going Reclamation activities in support of the objective specifically include the use of WaterSMART grants to "provide cost-share assistance to support the development of renewable resources"

(http://www.usbr.gov/power/Reclamation%20Sustainable%20Energy%20Energy%20Strategy%20.pdf).

PRESIDENT'S CLIMATE ACTION PLAN 2013: The President's Climate Action plan details the case for Federal action and leadership in response to climate change. Key elements of this strategy include accelerating and expanding the deployment of renewable energy projects, and implementing efficiency and conservation programs that can help reduce greenhouse gas emissions and prepare the nation for the impacts of climate change. This project directly accelerates and expands the implementation of the development of hydropower, a renewable energy project

(http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf).

DEPARTMENT OF INTERIOR'S (DOI) STRATEGIC PLAN 2011-2016: The DOI plan points to the development of "renewable energy potential as a strategy supporting the Department's goal of securing America's energy resources"

(http://www.doi.gov/pmb/ppp/upload/DOI_StrategicPlan_fy2011_2016.pdf).

Subcriterion No. F.2—Readiness to Proceed

Table 3 below summarizes the implementation plan for the Shavano Falls Hydroelectric Development Project. The table identifies the project schedule that shows the stages and duration of the proposed work including major tasks, milestones and dates.

Table 3. Shavano Falls Hydro Development Project – Timeline, Schedule, Stages & Duration, Tasks, Milestones, Dates

TASK	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2	2015 Q3	2015 Q4	Milestones & Dates
1. Obtain a Lease of Power Privilege (LOPP) from the Reclamation			→								Final signed LOPP (April 2014)
a. Pre-application document and notice of intent		→									Completed
b. Agency consultation and study plan	→	→	→								In progress
c. Impact studies	→	→	→								In progress
i) Rare plant survey (NEPA)		→									Complete
ii) Environmental assessment (NEPA)		→	→								In progress
iii) Archeological survey (NHPA)	→	→	→								Complete
d. Draft license application	→	→	→								Complete
e. Final license application	→	→	→								Complete
2. Authorize construction				→	→						Final LOPP (Apr 2014)
3. Release turbine/generator supplier for fabricating and delivery		→	→	→	→	→					Delivery (Dec 2014)
4. Penstock fabrication and delivery		→	→	→							Delivery (Apr 2014)
5. Release roller gates/draft tube for fabricating and delivery			→	→	→	→					Delivery (Dec 2014)
6. Excavation			→	→							
7. Earthwork/Civil			→	→	→	→	→				Photo Documentation of Completion (Apr 2015)
a. Penstock installation				→	→	→					
b. CP diversion/bypass						→	→				
c. CP Lateral enlargement			→	→	→	→					
d. Intake/forebay					→	→	→				

Cont. Table 3. Shavano Falls Hydro Development Project - Timeline, Schedule, Stages & Duration, Tasks, Milestones, Dates

	2013		2014				2015				Milestones & Dates
TASK	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
e. Powerhouse											
f. Tailrace dig down (CQ Lateral)											
g. CQ diversion box											
8. Concrete/Civil											Photo Documentation Project Completion (Apr
a. CP diversion/bypass, new roller gate support guides and trip gates											
b. Intake/screen structure											
c. Powerhouse structural concrete											
d. CQ diversion box											
9. Major mechanical equipment installation											Photo Documentation (April 2015)
10. Erect metal building											Photo Documentation (April 2015)
11. Complete turbine/generator installation											Photo Documentation (April 2015)
12. Complete mechanical/electrical auxiliaries											Photo Documentation (April 2015)
13. Complete transformer and substation, transmission lines structures											Photo Documentation (April 2015)
14. Testing											Generation Start-Up (April 2015)

Table Note 1: Only construction activities that are considered part of UVWUA normal Operation and Maintenance activities will commence prior to issuance of the LOPP and CE (e.g. construction of CQ diversion box).

Table Note 2: Activities shaded in gray have/will likely commence prior to WaterSMART grant funding announcement.

PERMITS

Please explain any permits that will be required, along with the process for obtaining such permits.

The construction of the Shavano Falls Hydropower Project requires compliance with the following local, state and federal, environmental, cultural and paleontological resource protection laws and regulations including:

1) National Environmental Policy Act (NEPA) Compliance: The NEPA sets up procedural requirement for all federal agencies to assess environmental impacts associated with all federal actions. The UVWUA understands that Reclamation will serve as the lead federal agency for determining NEPA compliance and evaluating all technical information. NEPA compliance activities are expected to be complete by the spring of 2014.

- T&E Plant Survey: The UVWUA hired Bio-Logic, Inc. to complete an endangered and/or threatened plant survey. There are no occurrences of clay-loving wild buckwheat or Colorado hookless cactus in the project area.

- T&E Animal Survey: The Bureau of Reclamation will complete a T&E animal survey for the project as part of their NEPA Compliance assistance on the project.

- Environmental Assessment: The Bureau of Reclamation Western Colorado Area Office will take the lead on completing an environmental assessment for the Shavano Falls Hydropower Development project. The expectation is that a Categorical Exclusion will be completed by Reclamation.

2) Clean Water Act (CWA) Compliance: CWA compliance will likely be required for impacts to Coal Creek wetlands. Wetland impacts are estimated to be less than 0.10 acre and are associated with the construction of two concrete piers for the elevated portion of the penstock and a temporary creek crossing. A wetland delineation has been requested from Bio-Logic and once completed can be made available upon request.

3) National Historic Preservation Act (NHPA) Compliance: A Class III cultural resources inventory of the Shavano Falls project area was completed by Alpine Archeological Consultants Inc., in October of 2013. All occurrences will be mitigated or avoided. Copies can be provided upon request.

4) Lease of Power Privilege (LOPP): The UVWUA has received a preliminary Lease & Funding Agreement from Reclamation (Appendix A)

5) Private Property Agreements: The UVWUA is currently in the process of securing long-term lease agreements and or easements for locating the powerhouse, intake and upper portion of the penstock on private property as outlined below:

- Powerhouse: A 99 year lease agreement has been negotiated with Lazy K Bar Land and Cattle to lease 3.92 acres for the powerhouse location. Negotiations are in the process and legal documents are expected to be signed spring of 2014.

- Intake and Upper Portion of the Penstock: A long-term easement agreement has been negotiated with Etchart Sheep Ranch for the hydroelectric facility intake and the upper portion of the penstock. Legal documents are being drafted and are expected to be finalized/signed spring of 2014.

All of the remaining portions of the Shavano Falls Hydroelectric Development Project are located on Reclamation property.

II. DESCRIPTION OF PERFORMANCE MEASURES

Subcriterion No. F.3—Performance Measures

The following performance measures are proposed in support of the documentation of benefits associated with the implementation of the Shavano Falls Hydroelectric Development project:

PERFORMANCE MEASURE A: Quantifiable Water Savings or Improved Water Management

Performance Measure No. A.1 – Canal Lining/Piping

Canal lining and lateral piping implementation associated with the Shavano Falls Hydroelectric Development Project will result in the reduction and/or elimination of seepage and salt loading occurring from the existing open, earthen delivery systems and a failing/leaking siphon (Estimated at 2,107 ac-ft/yr and 182 tons of salt/year). U.S. Bureau of Reclamation seepage estimates for the M&D Canal and the CQ, CP and BN Laterals are provided in Figure 5. Seepage values are based upon information developed in the 1982 Lower Gunnison Basin Unit Appendix B Hydrosalinity Model and based in some part on ponding and inflow-outflow tests. Seepage rates were subsequently modified with additional hydrologic and groundwater data in water budgets done for the west side of the UPA (personal communication, Mike Baker, retired Reclamation WCAO).

Table 2 on page 18 of this proposal summarizes salt seepage number received from the Bureau of Reclamation.

The UVWUA proposes to document the benefits of canal lining and piping on reducing delivery system water losses by comparing historical seepage rates provided by the Bureau with estimated post-project seepage estimates based upon approved lining and piping efficiency ratings. Canal lining (bentonite) is noted as having a 15 year life expectancy (NRCS National Engineering Handbook Series). Steel penstock pipe is estimated to be 100% efficient and metal culverts/siphons are rated as 100% efficient. Estimates of pre-project and post-project evaporative loss will also be taken into account.

a) Seepage reduction due to canal lining and lateral piping.

Pre-project: Document historical seepage and estimate evaporative losses of delivery system water in the M&D Canal and the CP and BN Laterals.

Post-project: Estimate post-project seepage and evaporative losses in the piped portion of the M&D Canal (new 1,760' section of steel penstock), BN Siphon and CP Lateral (enlarged, lined portion) based upon Reclamation seepage estimates for UPA Laterals/Canals.

Performance Measure No. A.2 – Measuring Devices

Not applicable.

Performance Measure No. A.3 – SCADA and GIS

Not applicable. Current plans are to access data from the hydropower site via telephone. The UVWUA has future plans (within the next 3-5 years) of incorporating "true" SCADA into the site and tying in data regarding hydropower output and associated canal flows which can be monitored from UVWUA headquarters. For now, should a failure occur at the hydroelectric plant, the response process includes an automated telephone dialer which will call up to 8 phone numbers and alert individuals of the problem. The dialer continues to call the numbers until an individual answers.

Performance Measure No. A.4 – Automation
Historical spillage going to the lower M&D Canal has been documented at the existing staff gage on the roll dam on Coal Creek. A new rating station is proposed for the lower M&D Canal which should also improve measurement data. Canal stability should be improved as a result of headgate automation associated with the hydroelectric facility and will be evident if fewer spills are occurring.

Pre-project: Access historical UVWUA records to obtain pre-project daily spill and flow going over the roll dam on Coal Creek and into the M&D Canal.

Post-project: Document post-project daily spill utilizing existing gage and new rating station to obtain data regarding spillage going over the roll dam on Coal Creek and into the M&D Canal.

- **Rationale**

The UVWUA is currently implementing incremental, system-wide automation throughout the UPA. The rationale is to tie automation into a planned system wide optimization schedule that correlates with on-going modernization efforts occurring throughout the UPA (especially the east side). The system optimization review (SOR) is currently in progress and is being lead by the Irrigation Training Research Center at Cal Polytech (ITRC). A final report is expected the fall of 2014. Implementation efforts are dependent upon funding.

- **Is there potential for automation occurring at the Shavano Falls site to heighten operational issues in other parts of the system?**

Water operations and management are carried out by UVWUA staff. All previous and currently proposed automation efforts have been evaluated by ITRC in the SOR process to prevent any potential negative operational issues.

- **Maintenance**

Automation technology will likely be maintained through a combination of both in-house and third party expertise.

- **Benefits of Automation**

Headgate automation at the Shavano Falls Hydroelectric facility will help maintain stable flows in the lower M&D Canal system. More stable flows should result in improved irrigation water management due to less "bouncing" in the canal.

•Performance Measure No. A.5 – Groundwater Recharge

Not applicable.

•Performance Measure No. A.6 – Irrigation Drainage Reuse

Not applicable.

•Performance Measure No. A.7 – Landscape Irrigation Measures

Not applicable.

PERFORMANCE MEASURE NO. B: Projects with Quantifiable Energy Savings

•Performance Measure No. B.1 – Implementation of Renewable Energy Improvements Related to Water Management and Delivery

1) Explain the methodology used for quantifying the energy generated from the renewable energy system.

Sorenson Engineering was hired to provide power generation calculations for the project. Daily flow data was not available for the area near the proposed hydroelectric facility, therefore a hydrographer was hired to measure daily flows several times throughout the irrigation season. Flows were measured in the CP and CQ Laterals and ¼ mile upstream of the proposed hydroelectric facility site in the M&D Canal. Measured flows were then combined with

UVWUA records of the turn-on and shut-off dates for the M&D Canal from 1997 thru 2012. Daily flows going over Shavano Falls were estimated for this 15 year period with extensive input from the UVWUA.

Energy generation (kilowatts) from the hydroelectric unit is calculated as the weight of water (pounds/cubic foot) multiplied by the head (feet), the flow (cubic feet per second), and 0.746/550 (conversion factor) while also considering turbine efficiency, generator efficiency, friction loss and k-losses.

Model results for power Generation from the Shavano Falls Hydroelectric Unit estimate annual energy generation as 12,973,000 kilowatts and can be found in Figure 3 on page 16.

2) Explain the methodology for calculating the quantity of energy savings resulting from the activity.

By taking annual energy generation estimated at the Shavano Falls Hydroelectric Unit (12,973,000) and dividing that by the average annual energy consumption of a U.S. residential utility customer (11,280 kWHr), it was determined that 1,150 residential homes could be supplied with renewable energy which is energy saved or unused from for example coal burning power plants.

There are also energy savings by providing the power produced at the site to the local community and eliminating transmission line loss.

Finally, the energy of the water going over Shavano Falls had not been harnessed and thus was being wasted. The construction of the hydroelectric unit will utilize this energy.

3) Explain the anticipated cost savings for the project.

Water savings associated with hydroelectric project will come from eliminating delivery system water loss through piping, lining, and the elimination of open flows in portions of the canal and lateral near the hydro site. Seepage losses were calculated to be 3,772 ac-ft/year which can now be provided to downstream UPA water users.

By providing energy generated from the plan to the local community, there will be less energy transmission line loss (1%). DMEA estimates a 5% line loss for power brought in from outside the area.

Environmental savings include offsetting fossil fuel CO_2 emissions which are harmful to the environment (27,000,000 to 28,000,000 pounds).

4) Include an estimate of energy conserved.

Energy conserved by providing energy locally is the difference between outside transmission line loss (5%) versus local transmission line loss (1%) which is 4%. The energy conserved would be 4% of 12,973 MWHr which is equal to 519 MWHrs annually.

Another way of looking at energy conservation for the project is that the hydroelectric facility has harnessed existing unutilized energy at the Shavano Falls drop (12,973 MWHrs) and replaced an equal amount that would have to be generated through fossil fuel combustion.

Performance Measure:

a) Pre-project: The estimated power generation of the Shavano Falls Hydropower facility is 12,973,000 kWHr per year of clean, renewable energy.

   Post-project: Power generation data/reports from the Shavano Falls facility supporting the amount of clean energy produced.

b) Pre-project: Estimate pre-project CO_2 emissions for 12,973,000 kWHr of coal produced energy based upon accepted standards.

   Post-project: Estimate post-project CO_2 emission reductions for 12,973,000 kWHr of hydroelectricity produced based upon accepted standards.

•Performance Measure No. B.2 – Increasing Energy Efficiency in Water Management

Not applicable.

PERFORMANCE MEASURE NO. C – Projects that Benefit Endangered Species and/or Critical Habitat

Documenting the benefit of accelerated recovery of endangered fish species will not be feasible during this project timeline. A large amount of selenium must be removed from the river system and from the aquatic food web in order to document a positive benefit on endangered river fish within the project timeline. For example, in order to meet the 4.6 ppb chronic water-quality standard for selenium during an average hydrologic period similar to 2006-2010 where the 85th percentile dissolved selenium concentration is equal to approximately 5.58 ppb, it is estimated that approximately 2,800 pounds of selenium will need to be controlled. This is the current goal of the Selenium Task Force and the SMP which may likely be accomplished in the next 10-15 years due to efforts such as those taking place in the UP.

It is important to note that current water-quality trends at the Gunnison River at Whitewater, Colorado show a 29% decrease in selenium concentration during the 1986-2008 period due to man-induced activities (i.e. piping, lining, more efficient on-farm practices, improved irrigation water management, Reclamation UPA winter water program, etc.).

•Methodology for determining recovery rate.

The UVWUA is unsure as to what type of performance measure to propose due to the reasons stated above. Documenting reduced spills as a means of showing canal stability

could also be used to demonstrate a nexus to the potential for improved irrigation water management in areas like California Mesa with high selenium soils. Another option may be to request a letter from Reclamation environmental compliance staff stating the benefits of improved canal control and measurement toward endangered species compliance as part of Aspinall Unit re-operations.

- How will the project address designated critical habitat?

There are no known endangered, threatened or candidate species occupying the Shavano Falls Hydroelectric site (awaiting animal survey by Reclamation). Critical habitat for endangered fish species occurs downstream of the hydroelectric site in the Gunnison River below Delta, Colorado and in the Colorado River near Grand Junction, Colorado.

Any potential new water supplies that result from associated canal lining, lateral piping, or elimination of flows in laterals surrounding the hydro plant will be left in the irrigation system for use by downstream water users in the UPA. There are no water banks/marketing mechanisms in place in the Gunnison Basin for endangered fish species.

Benefits to endangered fish species will result from better control and measurement of water flowing through the Uncompahgre Project (Aspinall Unit Re-operations) should a water-resource and endangered species conflict occur.

- Unavoidable negative impacts to endangered, threatened or candidate species and/or critical habitat?

At this time, we do not expect any negative impacts to endangered, threatened or candidate species and/or critical habitat.

PERFORMANCE MEASURE No. D – Projects that Establish a Water Market

Not applicable.

V.A.7 Evaluation Criterion G: Additional Non-Federal Funding (4 points)

Non-Federal Funding (**89 %**): $6,957,303.40

Total Project Cost: $7,807,303.40

V.A.8 Evaluation Criterion H: Connection to Reclamation Project Activities (4 points)

(1) How is the proposed project connected to Reclamation project activities?

The proposed Shavano Falls Hydroelectric Development project is connected to Reclamation project activities in that it directly meets the mission of the U.S. Department of the Interior (DOI) which is to "protect America's *natural resources* and heritage, honor our cultures and tribal communities, and *supply the energy to power our future*" (emphasis added). The Uncompahgre Project was authorized for the sale of hydroelectric power under the Reclamation Act of 1938 (52 Stat. 941), Sale of Surplus Power, Uncompahgre Valley Project.

The hydropower project also works with the DOI's WaterSMART Program framework for "...integrating water and energy policies to support the *sustainable use of all natural resources, and coordinating the various water conservation activities of various Department bureaus and offices*" (emphasis added).

This project is connected to the following Reclamation activities:

• Uncompahgre Project SOR: An UPA SOR is being carried out in cooperation with SMP stakeholders and the Bureau of Reclamation. The SOR integrates off-farm delivery system optimization and efficiency planning and implementation with on- and near-farm water application efficiency goals, on-going hydropower generation, and water security.

•Gunnison Basin Selenium Management Program (SMP): The SMP is a conservation measure identified in the 2009 Gunnison Basin Programmatic Biological Opinion that must be implemented by Reclamation and all lower Gunnison Basin stakeholders to mitigate for the effects of on-going irrigation depletions on endangered species. The SMP Action Plan calls for "Encouraging and facilitating system optimization on the East Side of the Uncompahgre Project Area ....and in other parts of the lower Gunnison" where optimization leads to on-farm irrigation efficiency in high selenium soils. The above SOR is being funded through Colorado Species Conservation Trust Funds made available for implementation of SMP activities occurring in the Lower Gunnison Basin. Headgate automation and remote monitoring associated with the hydropower project will enable improved irrigation water management practices which may result in selenium reduction benefits; especially in high selenium areas on the west side of the UPA, such as California Mesa, which is served by the CQ Lateral system and the lower M&D Canal.

•Lower Gunnison Basin Salinity Control: The Uncompahgre Project is identified as a salinity control area by the Colorado River Basin Salinity Control Program. The UVWUA has successfully competed in Reclamation's Basinwide Salinity Control Program to implement over 73.24 miles of lateral piping.

•Aspinall Unit Operations Record of Decision (ROD) (April 2012): The proposed action of the Aspinall Unit Environmental Impact Statement (EIS) involves modifying reservoir

operations that will result in higher and more natural downstream spring flows and moderate base flows. This action will avoid jeopardizing the continued existence of fish listed under the Endangered Species Act (ESA) and does not result in the destruction or adverse modification of critical habitat in the Gunnison and Colorado rivers. Flows released from the Aspinall Unit flow through the UPA. Headgate automation and remote will allow the UVWUA and Reclamation to better control and account for flows going through the UPA for the benefit of endangered species.

(2) Does the applicant receive Reclamation project water?

Yes, from the Gunnison River via the Gunnison Tunnel and the federal Aspinall Unit.

(3) Is the project on Reclamation project lands or involving Reclamation facilities?

Yes, the project is located on Reclamation project lands and involves Reclamation facilities in the UPA.

(4) Is the project in the same basin as a Reclamation project or activity?
Yes. The federal Uncompahgre Project Area is located in the lower Gunnison Basin.

(5) Will the proposed work contribute water to a basin where a Reclamation project is located?

Yes. Piping and lining activities associated with the hydropower development project (CP Lateral lining, BN Lateral siphon replacement, piping of M&D Canal flows to the penstock) and elimination of flows in existing sections of the M&D Canal and CQ Lateral will eliminate delivery system losses due to leakage (estimated at 3,765 ac-ft per year). Additional water supplies resulting from this project will be utilized by water users on the downstream end of the lateral in the UPA who are most impacted by periods of drought in water short years.

III. ENVIRONMENTAL COMPLIANCE

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

Earth disturbing activities associated with the project include enlargement and lining of the CP Lateral, construction of a new powerhouse and switchyard and associated access road, the penstock outlet diversion box to the CQ Lateral, CQ Lateral enlargement/improvements, new diversion pipe to Coal Creek, and replacement of the BN Lateral siphon.

•Soil (dust): Dust impacts associated with the earth disturbing activities described above will be temporary (during construction activity) and will be mitigated by having a water

truck(s) on site. Any road dust problems associated with vehicle traffic during construction of the hydropower facility will also be temporary and can be mitigated with water trucks.

•Air Quality: There are no air-quality impacts identified with the project.

•Water (quality and quantity): There will be minimal and temporary water-quality impacts associated with construction of a diversion pipe from the CQ Lateral to Coal Creek. A soil erosion plan will be put into effect.

Water quantity will be unchanged.

•Animal Habitat: Reclamation (WCAO) will conduct an Environmental Assessment which will include an assessment of animals and animal habitat affected by the project.

(2) 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?

The plant surveys conducted by Bio-Logic found no evidence of clay-loving buckwheat or Colorado hookless cactus found in some areas of the Uncompahgre Project. No other listed or proposed federal threatened or endangered plant species were found in the project area.

A survey of potential threatened or endangered animal species impacted by the project will be conducted by the Reclamation's Western Colorado Area Office. At this time, UVWUA is not aware of any T&E or candidate animal species or critical habitat in the project area.

(3) 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 project may have.

•Coal Creek is a natural stream with associated jurisdictional wetlands that fall within the Shavano Falls project boundary. Less than 0.10 acres of jurisdictional wetland will be impacted by the project and are associated with the construction of two concrete piers and a temporary stream crossing on Coal Creek.

•There will be no wetland disturbance associated with installation of the *transmission line*.

•There will be minor and temporary wetland impacts associated with the construction of the lower section of the *steel penstock* which will be elevated above Coal Creek and supported by piers.

•There will be minor and temporary wetland impacts associated with the construction of a new diversion pipe from the CQ outlet to Coal Creek.

Reclamation has previously consulted with the Army Corps of Engineers (2008) to clarify both agencies' understanding of CWA regulatory requirements in relationship to construction and maintenance of irrigation ditches or canals. Under regulatory guidance letter No. 07-02, construction or maintenance of irrigation ditches are exempt from the need to obtain a CWA Section 404 permit. In addition, wetlands that have developed as a result of leakage or water loss from the laterals are "not considered waters of the U.S." A copy of the consultation letter can be provided upon request.

(4) When was the water delivery system constructed?

"The M&D Canal was a pioneer canal in the Uncompahgre Valley and was constructed between 1883 and 1888 by the Montrose and Delta Canal Company to convey water from the western side of the Uncompahgre River to farmland on the western side of the valley, namely Spring Creek and California mesas" (Cultural Resources Inventory, 2013). The M&D Canal was the first canal purchased by the UVWUA with a decree date of June 30, 1890 (UVWUA, 2013).

(5) Will the 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 following information comes from the *Cultural Resources Inventory of Three Potential Hydropower Sites Montrose County Colorado (2013)* completed by Alpine Archeological on behalf of the UVWUA.

Diversion Structures:

CP Lateral Diversion: The CP Lateral was constructed as part of the original M&D Canal system (1883-1888). In 1932, the timber diversion at the head of the canal was replaced by the current concrete structure. The current check structure on the M&D Canal will be replaced with bypass roller gates and the CP diversion structure will be replaced by trip/bypass gates.

CQ Lateral Diversion Structure: The original CQ Lateral timber diversion structure was likely constructed between 1910-1912. The original CQ Lateral diversion structure will remain unchanged and will likely only be used in bypass situations. A new secondary CQ Lateral diversion structure will be constructed at the outlet of the tailrace/penstock.

Coal Creek Diversion Structure: Flows in the M&D Canal are currently directed toward Coal Creek about 250' after the CQ Lateral diversion point. At this time, Coal Creek serves as a carrier for the M&D for about 5 miles. A new secondary diversion structure will be constructed in the CQ lateral discharge box to direct flows to Coal Creek.

Headgates:

CP Lateral Headgate: The existing headgate on the CP Lateral was constructed at the same time as the M&D canal (1883-1888). The headgates will be moved 1200' downstream and will consist of two 48" roller gates.

Intake Roller Gate: A new Intake roller gate will be constructed to direct flow from the M&D Canal to the hydroelectric facility.

CQ Headgate: The existing CQ headgate will remain and only be used in bypass situations. A new secondary headgate will be constructed in the CQ Lateral downstream of the existing headgate near the penstock outlet.

Coal Creek Headgate: The existing check structure at the CQ headgate will remain.

Canals:

M&D Canal: The M&D Canal was originally constructed sometime between 1883 and 1888 and purchased by the UVWUA in 1908. Considerable upgrading was done between 1909 and 1910 in order to increase its carrying capacity. The existing check structure on the M&D will be replaced with a bypass roller gate. Approximately ¼ mile section of the M&D canal was lined in the mid 80's due to a major canal slide.

Laterals:

CP Lateral: The CP Lateral was constructed as part of the original M&D Canal system (1883-1888). The first 1200' of the CP lateral will be enlarged in order to carry 310 cfs to the Intake of the Hydro facility (220 cfs) and the CP Lateral (90 cfs).

CQ Lateral: The exact date of construction of the CQ Lateral is unknown. The diversion at the head of the canal was constructed sometime between 1910 and 1912. The outlet of the hydroelectric facility will go into a discharge box in the CQ Lateral. This box will also serve as a divider for water going into the CQ (130 cfs) and the balance into Coal Creek (90 cfs). The first 1200' of the CQ lateral will be dug down to lower the level of the water coming out of the powerhouse.

BN Lateral: The BN Lateral siphon is a 16" steel pipe that crosses both the CP Lateral and the M&D Canal. The UVWUA proposes to replace the entire siphon. Instead of fluming above and across the lateral and canal it will be installed underneath. The UVWUA estimates that the existing BN siphon was constructed sometime around the mid 60's and is therefore approximately 50+ years old.

Flumes:

CQ Lateral Flume: The existing CQ Lateral flume carries water across Coal Creek during the irrigation season. The only proposed change is that the CQ Lateral flume will be used only in bypass situations.

(6) Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places?

Yes, there are many historic features in the Uncompahgre Project as it is over 100 years old. The M&D Canal, CQ and CP Laterals, and CCC Shavano Falls Road are all within the project site area and are recommended as eligible for inclusion in the National Register of Historic Places (NRHP).

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

Nine sites and one isolated find were located in the Shavano Falls area. Only those sites listed above were recommended for inclusion in the NRHP.

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

No.

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

No.

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

No.

IV. REQUIRED PERMITS AND APPROVALS

The construction of the Shavano Falls Hydropower Project requires compliance with the following local, state and federal, environmental, cultural and paleontological resource protection laws and regulations including:

NEPA Compliance (CE): The Bureau of Reclamation Western Colorado Area Office (WCAO) will take the lead for ensuring NEPA compliance. The expectation is that a Categorical Exclusion will be completed.

Endangered Species Act (ESA): The Bureau of Reclamation WCAO will take the lead for ensuring ESA compliance and will request Section 7 consultation from the U.S. Fish and Wildlife Service, if required.

Clean Water Act (CWA) Compliance (404 Permit): A wetland delineation has been requested from Bio-Logic. Shavano Falls Hydro LLC with work with the Corps of Engineers to obtain a 404 permit for wetland impacts of less than 0.10 acre.

National Historic Preservation Act (NHPA) Compliance: A Class III cultural resources inventory of the Shavano Falls project area was completed by Alpine Archeological Consultants

Inc., in October of 2013. All occurrences will be mitigated or avoided. Reclamation will take the lead in obtaining State Historical Preservation Organization (SHPO) concurrence for the project.

Lease of Power Privilege (LOPP): Reclamation shall take the lead in the development and implementation of the LOPP, including but not limited to: contract development, design review, and technical assistance, as needed, related to construction, operation, maintenance and security of the power facility. The UVWUA has received a preliminary LOPP & Funding Agreement from Reclamation and has deposited $40,000 into a federal account in support of the above identified activities. A copy may be obtained from the UVWUA upon request.

Private Property Agreements: The UVWUA has entered into long-term lease agreements for locating the powerhouse, intake and upper portion of the penstock on private property as outlined below:

- Powerhouse: A 99 year lease agreement has been negotiated with Lazy K Bar Land and Cattle to lease 3.92 acres for the powerhouse location. Legal documents are being finalized and are expected to be signed spring of 2014.

- Intake and Upper Portion of the Penstock: A long-term easement has been negotiated with Etchart Sheep Ranch for the hydroelectric facility intake and the upper portion of the penstock. Legal documents are being drafted and are expected to be finalized by the spring of 2014.

Board Resolution: A resolution from the UVWUA Board has been provided in Appendix B.

Ag Agreement: An agricultural operations agreement has been signed by the UVWUA and is attached as Appendix E.

V. PROJECT FUNDING PLAN

A. FUNDING PLAN & LETTERS OF COMMITMENT

The funding plan must include all project costs, as follows:

(1) How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant (e.g., reserve account, tax revenue, and/or assessments).

The UVWUA will contribute cost share in the amount of $153,894.60 through in-kind service related to the development, implementation, and management of the Shavano Falls Hydroelectric Project. Funds will be derived from water user assessments. A UVWUA letter of financial commitment has been provided in Appendix C.

(2) Describe any in-kind costs incurred before the anticipated project start date that you seek to include as project costs. Include:

(a) What project expenses have been incurred?

Project expenses incurred to date by entity include:

UVWUA: The UVWUA has incurred costs related to the development of the hydroelectric project associated with development of the feasibility study and the draft LOPP and preliminary funding agreements, negotiation and drafting of the power purchase agreements, negotiating private property land owner leases, easements and/or purchases, canal flow measurement and rating chart development, WaterSMART grant application development, and legal fees.

Shavano Falls Hydro LLC: Shavano has incurred costs related to the development of the hydroelectric project including travel, registration with the State of Colorado, geospatial studies, mechanical – roller and trip gates, penstock pipe, and interconnect study.

(b) How they benefitted the project?

All of the activities identified above benefitted the project by making the project a reality and ensuring its readiness to proceed. The UVWUA is the entity who will hold the LOPP for the project.

(c) The amount of the expense?

The UVWUA has spent a total of $48,627.24:

Legal:	$ 7,138.00
Consulting:	$ 3,255.53
Studies:	$ 3,175.00
Proj Dev:	$35,058.71

Shavano falls Hydro LLC has spent a total of $580,405.34:

Penstock Pipe:	$200,000.00
Fees:	$ 50.00
Studies:	$ 8,955.00
Travel:	$ 400.34
Mechanical:	$371,000.00

(d) The date of cost incurrence?

UVWUA in-kind costs identified above were incurred during the period 9/1/13 to 1/9/14.

Shavano Falls Hydro LLC expenditures identified above were incurred over the period 10/14/13 to 1/13/14.

(3) Provide the identity and amount of funding to be provided by funding partners, as well as the required letters of commitment.

UVWUA:	$153,894.60 (Appendix C)

Shavano Falls Hydro LLC (Cash + Loan):		$6,803,408.80 (Appendix D)
	TOTAL:	**$6,957,303.40**

(4) Describe any funding requested or received from other Federal partners. Note: other sources of Federal funding may not be counted towards your 50 percent cost share unless otherwise allowed by statute.

Not applicable.

(5) Describe any pending funding requests that have not been approved, and explain how the project will be affected if such funding is denied.

Shavano Falls Hydro LLC is currently working on loan terms with CoBank, ACB and Northwest Farm Credit Services for approximately $5,736,000. Although a final commitment to provide financing has not been received, the process is proceeding smoothly and on schedule. A letter of commitment from the financial institutions will be available March 2014. A letter of commitment from Shavano Falls Hydro LLC has been attached as Appendix D. The letter expresses their commitment to the project and to securing the loan and providing additional cash match to the project.

If the loan is not approved, the project will not go forward.

Table 1. – Summary of non-Federal and Federal funding sources

Funding Sources	Funding Amount
Non-Federal entities	
1. Uncompahgre Valley Water Users Association (cash)	$ 0
2. Uncompahgre Valley Water Users Association (in-kind)	$ 153,894.60*
3. Shavano Falls Hydro LLC (cash)	$ 1,067,408.80*
4. Shavano Falls Hydro (Loan)	$ 5,736,000.00*
Non-Federal subtotal:	$ 6,957,303.40
Other Federal entities (None)	$ 0
Other Federal subtotal:	$ 0
Requested Reclamation funding:	$ 850,000.00
Total project funding:	$7,807,303.40

Table 2. – Funding Group II Funding Request

Funding Group II Request			
	Year 1 (FY 2014)	Year 2 (FY 2015)	Year 3 (FY 2016)
Funding Request	$500,000	$350,000	$0

BUDGET PROPOSAL

Table 3. – Funding Sources

Funding Sources	Percent of Total Project Cost	Total Cost by Source
Recipient funding	89%	$ 6,957,303.40
Reclamation funding	11%	$ 850,000.00
Other Federal funding	0%	$ 0
Totals	**100%**	**$7,807,303.40**

Table 4. Budget Proposal - Shavano Falls Hydroelectric Development

Budget Item Description	COMPUTATION $/Unit	Units	Quantity Labor	Quantity Materials /Other	Quantity Type ($/hour)	Quantity Type (hours/days)	TOTAL COST
Salaries And Wages							
Steve Fletcher, Manager UVWUA	38.5		1633				**$62,870.50**
Ed Suppes, Assist Manager UVWUA	35.1		864				**$30,326.40**
Fringe Benefits							
Steve Fletcher, Manager	7.09		1633				**$11,577.97**
Ed Suppes, Assist Manager	6.81		864				**$5,883.84**
Travel							
Shavano Falls Hydro LLC	$3,000	20					**$60,000.00**
Reclamation	Lump Sum	1	5,000				**$5,000.00**
Equipment							
Excavator		2			110	8	**$1,760.00**
Backhoe		2			71.25	8	**$1,140.00**
Materials & Labor							
Fittings (BN Siphon)		2		120			**$239.16**

Pipe (BN Siphon - 580 feet) 18" 125 PVC		580		17			**$9,773.00**
Francis Turbines & Generator	Lump Sum	1	139,600	558,400			**$698,000.00**
Switchgear	Lump Sum	1	88,500	88,500			**$177,000.00**
Terminal Box & Voltage Regulator	Lump Sum	1	3,000	27,000			**$30,000.00**
DC Battery System	Lump Sum	1	2,000	18,000			**$20,000.00**
Start Up	Lump Sum	1	20,000	0			**$20,000.00**
Electrical Wiring	Lump Sum	1	42,500	42,500			**$85,000.00**
Interconnect	Lump Sum	1	70,000	70,000			**$140,000.00**
Step Up Transformer	Lump Sum	1	5,000	45,000			**$50,000.00**
New Transmission Line	Lump Sum	1	50,000	50,000			**$100,000.00**
Contractual/Construction							
Mountain State - Civil	Lump Sum	1	2,334,500	1,000,500			**$3,335,000.00**
Selway Pipe	Lump Sum	1	261,900	611,100			**$873,000.00**
Riverside - Mechanical	Lump Sum	1	672,000	168,000			**$840,000.00**
Other Contractual/Miscellaneous							
Permitting (Negotiation & Dev of Lease, Env Compliance)	Lump Sum	1	25,000				**$25,000.00**
Env Compliance Cost: Archeological Consultant	Lump Sum	1	5,000				**$5,000.00**
Env Compliance Cost: Plant Survey Consultant	Lump Sum	1	5,000				**$5,000.00**
Reclamation: NEPA Review	Lump Sum	1	25,000				**$25,000.00**
Reclamation: Planning & Design Tech Assist	Lump Sum	1	4,000				**$4,000.00**
Engineering	Lump Sum	1	390,000				**$390,000.00**
Materials Testing, Surveying, Geotech Studies, CFD, etc.	Lump Sum	1	125,000				**$125,000.00**
WaterSMART Grant Prep (Consultant)	$43					75.71	**$3,255.53**
Grant Reporting & Doc of Perf Measures	$43					81.4	**$3,500.20**
Contractual Legal (LOPP, PPA, etc.)	Lump Sum	1	25,000				**$25,000.00**

UVWUA Legal &Consulting (ROW & Feasibility)	Lump Sum	1	13,568				**$13,568.00**
Other							
Freight & Customs Duties	Tax	1	n/a	48,860			**$48,860.00**
Contingency: Hydro Proj	8%	1	283,274	283,274			**$566,548.80**
Contingency: Reclamation LOPP & Agreement	18.6%	1					**$11,000.00**
Total Direct Costs							**$7,807,303.40**
UVWUA - none claimed							**$ -**
Total Indirect Costs							**$ -**

C. BUDGET NARRATIVE

1. Salaries and Wages

Key personnel associated with the Hydropower Project include:

UVWUA: Steve Fletcher, Manager (1,633 hrs. @ base rate $38.50, fringe $7.09)

UVWUA: Ed Suppes, Assistant Manager (864 hrs. @ base rate $35.30, fringe $6.81)

Shavano Falls
Hydro LLC (Engineering):
Ted Sorenson, P.E. (1219 hrs. @ base rate $60, fringe $20.00)
Mike Jardine, P.E. (1219 hrs. @ base rate $25, fringe $10.00)
Bruce Bradely, P.E. (406 hrs. @ base rate $60, fringe $20.00)
Teddy Sorenson, E.I.T. (1219 hrs. @ base rate $25, fringe $20.00)

*There are no proposed salary increases.

2. Fringe Benefits

Please see fringe benefits identified for key personnel above. Costs included in this category include social security, Medicare, state and federal unemployment, medical insurance, worker's compensation, and life and accidental death and disability insurance.

3. Travel

Travel expenses associated with the project have been identified as a lump sum by both Reclamation and Shavano Falls Hydro LLC.

RECLAMATION: The Reclamation Western Colorado Area Office did not provide details as to the number of persons traveling but it is assumed that given their proximity to the Shavano Falls Site (1 hour by car) that any trips to the site will be daily, there will be no airfare expenses, lodging or meal per diems. Beginning January 1, 2014, IRS standard mileage reimbursement rates are $0.56/mile.

SHAVANO FALLS HYDRO LLC: It is unknown at this time how many individuals from Shavano Falls Hydro LLC will be traveling at any given time (1-4 possible). The estimate of $60,000 incorporated 20 trips at $3,000/trip. There will be no mileage reimbursement associated with their travel as they will likely be renting a vehicle while they are in the area. Length of stays may vary depending upon phase of the project, but are likely to average 16 nights/month.

Meal per diem:	$ 30/day
Hotel:	$75/night
Rental Car:	$ 35/day
Airfare:	$530 per RT ticket from Idaho Falls

4. Equipment

There is no equipment being purchased for this project.

There is some equipment owned by the UVWUA which will be used during the project:

Backhoe: $71.25/hour (16 hrs.)
Excavator: $110/hour (16 hrs.)
Crew Truck: $20/hour (not claimed as in-kind toward project)

Only the costs of the backhoe and excavator have been counted as in-kind toward the project. Use of the two pieces of equipment is related to the BN siphon replacement.

5. Materials and supplies

All materials identified in the WaterSMART budget proposal relate to construction of the hydroelectric facility. Prices are based upon past experience, quotes, and engineering estimates.

The table below is copied from the budget proposal and identifies quantity and unit price of materials required for construction.

Budget Item	$/Unit	Units	Quantity Labor	Quantity Materials /Other	Quantity Type ($/hour)	Quantity Type (hours /days)	Total Cost
Materials & Labor							
Fittings (BN Siphon)		2		120			**$ 239.16**
Pipe (BN Siphon - 580 feet) 18" 125 PVC		580		17			**$ 9,773.00**
Francis Turbines & Generator	Lump Sum	1	139,600	558,400			**$ 698,000.00**
Switchgear	Lump Sum	1	88,500	88,500			**$ 177,000.00**
Terminal Box & Voltage Regulator	Lump Sum	1	3,000	27,000			**$ 30,000.00**
DC Battery System	Lump Sum	1	2,000	18,000			**$ 20,000.00**
Start Up	Lump Sum	1	20,000	0			**$ 20,000.00**
Electrical Wiring	Lump Sum	1	42,500	42,500			**$ 85,000.00**
Interconnect	Lump Sum	1	70,000	70,000			**$ 140,000.00**
Step Up Transformer	Lump Sum	1	5,000	45,000			**$ 50,000.00**
New Transmission Line	Lump Sum	1	50,000	50,000			**$ 100,000.00**

6. Contractual

The Project Timeline, Tasks, and Milestones table on pages 32 & 33 identifies all tasks to be accomplished by the UVWUA, consultants and contractors. All prices are contractual. A breakdown of labor and materials associated with the construction of the hydroelectric facility is provided in the table. Budget costs were determined to be fair and reasonable based upon UVWUA's significant experience carrying out construction project and past experience from the implementation of hydro at Drop Structures 1 and 3 on the South Canal.

At this time there is no detailed budget breakdown for contractual laborers (excluding key personnel) given that we are in the pre-feasibility level of planning. A detailed break-down can be provided upon request. Shavano Falls Hydro did provide the following breakdown of labor and materials by task.

Capital Cost Estimate, Shavano Hydro

Task		Total	% Labor	% Materials	Total Labor + Fringe	Total Materials	Total Fringe (30%)	Total Labor Only	Total Tax
Powerhouse									
	Mountain States Civil	$3,335,000	70%	30%	$2,334,500	$1,000,500	$700,350	$1,634,150	
	Selway Pipe	$873,000	30%	70%	$261,900	$611,100	$78,570	$183,330	
Mechanical									
	Francis Turbine and Generator	$698,000	20%	80%	$139,600	$558,400	$41,880	$97,720	
	Freight and customs duties	$48,860							$48,860
	Mechanical Riverside	$840,000	80%	20%	$672,000	$168,000	$201,600	$470,400	
Electrical									
	Switchgear	$177,000	50%	50%	$88,500	$88,500	$26,550	$61,950	
	Terminal Box and Voltage regulator	$30,000	10%	90%	$3,000	$27,000	$900	$2,100	
	DC Battery System	$20,000	10%	90%	$2,000	$18,000	$600	$1,400	
	Start Up	$20,000	100%		$20,000		$6,000	$14,000	
	Electrical Wiring	$85,000	50%	50%	$42,500	$42,500	$12,750	$29,750	
Interconnect to DMEA									
	Interconnect	$140,000	50%	50%	$70,000	$70,000	$21,000	$49,000	
	Step Up Transformer	$50,000	10%	90%	$5,000	$45,000	$1,500	$3,500	
	New Transmission Line	$100,000	50%	50%	$50,000	$50,000	$15,000	$35,000	
Miscellaneous									
	Permitting	$25,000	100%	0%	$25,000	$0	$7,500	$17,500	
	Archeological Consultant	$5,000	100%	0%	$5,000	$0	$1,500	$3,500	
	Plant Survey	$5,000	100%	0%	$5,000	$0	$1,500	$3,500	
	Wetland Delineation								
	Bureau of Rec Review	$30,000	100%	0%	$30,000	$0	$9,000	$21,000	
	Engineering	$575,000	100%	0%	$575,000	$0	$172,500	$402,500	
	Legal and Misc	$25,000	100%	0%	$25,000	$0	$7,500	$17,500	
	Contingency (8%)	$566,549	50%	50%	$283,274	$283,274	$84,982	$198,292	
Total Materials and Labor:						**$2,962,274**	**$1,391,182**	**$3,246,092**	**$48,860**

7. Environmental and Regulatory Compliance Costs

A total of $70,000 plus has been budgeted for environmental compliance activities associated with the project which is 1% of the project costs. Costs are identified as "Env Compliance" and under Steve Fletcher, Manager labor.

8. Reporting

The UVWUA understands that semi-annual reporting and a final report will be required in the event grant funding is awarded. Funds have been budgeted to contract with a professional grant consultant to conduct 5 semi-annual reports and 1 final report as required under WaterSMART grant reporting guidelines.

9. Other Expenses

No other expenses have been identified with the project that haven't been presented in the budget or budget narrative.

10. Indirect Costs

No indirect costs have been included with the Shavano Falls Hydroelectric Development Project.

11. Total Costs

Total project cost for construction and implementation of the Shavano Falls Hydroelectric Development Project is $7,807,303.40

12. Budget Form SF 424 C

See Below.

Contract No. 2014-0031-CF-0001

PRELIMINARY LEASE AND FUNDING AGREEMENT
BETWEEN
BUREAU OF RECLAMATION
AND
UNCOMPAHGRE VALLEY WATER USERS ASSOCIATION
FOR
SHAVANO FALLS LEASE OF POWER PRIVILEGE
COST-RECOVERY

1. THIS PRELIMINARY LEASE AND FUNDING AGREEMENT (Agreement) is made pursuant to the Reclamation Act of 1902 approved June 17, 1902 (32 Stat. 388), and acts amendatory thereof or supplementary thereto, particularly the Contributed Funds Act of March 4, 1921 (43 U.S.C. § 395), between the Bureau of Reclamation (Reclamation) and the Uncompahgre Valley Water Users Association (Association), for the purpose of contributing funds to Reclamation to perform environmental, and other services necessary to establish and implement a Lease of Power Privilege (LOPP).

WITNESS TO

2. EXPLANATORY RECITALS

2.1 WHEREAS, the Uncompahgre Project, located on the western slope of the Rocky Mountains in west-central Colorado, was authorized for construction by the Secretary of the Interior on March 14, 1903, under the provisions of the Reclamation Act of 1902;

2.2 WHEREAS, the Uncompahgre Project was authorized to allow for the sale of hydroelectric power under the Act of June 22, 1938 (52 Stat. 941), Sale of Surplus Power, Uncompahgre Valley Project;

2.3 WHEREAS, the electricity generated by the proposed hydropower plant to be located on the Montrose and Delta M & D Canal at Shavano Falls will provide a clean, renewable energy source;

2.4 WHEREAS, a proposal was reviewed by Reclamation staff and it has been determined that negotiations should proceed with the Association for the LOPP on the M & D Canal at Shavano Falls;

2.5 WHEREAS, under Reclamation law and policy, the Association is required to pay in advance all costs associated with work undertaken by Reclamation necessary for completion of this project; and

2.6 WHEREAS, the Contributed Funds Act of March 4, 1921 provides authority for the Secretary of the Interior, acting through Reclamation, to receive moneys, without further appropriation. The law states: "All moneys received after March 4, 1921, from any State, municipality, corporation, association, firm, district, or individual for investigations, surveys, construction work, or any other development work incident thereto involving operations similar to those provided for by the reclamation law shall be covered into the reclamation fund and shall be available for expenditure for the purposes for which contributed in like manner as if said sums had been specifically appropriated for said purposes".

NOW THEREFORE, in consideration of the foregoing the parties agree to the following:

3. PURPOSE

3.1 The purpose of this Agreement is to receive funding from the Association for Reclamation's assistance in the development of the LOPP at Shavano Falls on the M & D Canal and identify timelines for the LOPP process.

4. RESPONSIBILITIES

4.1 Reclamation will assure that all actions identified in its Scope of Work below are complete.

4.2 The Association will assure that all actions identified in its Scope of Work below are complete.

5. RECLAMATION'S SCOPE OF WORK

5.1 Reclamation will be the lead agency for ensuring compliance with the National Environmental Policy Act (NEPA), Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA); and will request consultation from the U.S. Fish and Wildlife Service pursuant to Section 7 of the ESA, if consultation is required.

5.1 The Reclamation LOPP lead contact on this project will be Mr. Richard Clayton, as identified in Section 11.1 herein. Reclamation shall schedule a meeting within 30 calendar days of the execution of this Agreement. The attendees will be Reclamation staff and the Association representatives. The purpose of this meeting will be to ensure all understand the roles and responsibilities of each of the parties in the LOPP process. The agreed upon terms, roles, and responsibilities resulting from this meeting will be documented in a manner agreeable to the parties involved.

5.2 Reclamation shall perform tasks related to the development and implementation of the LOPP, including, but not limited to: contract development, design review, and technical assistance, as needed, related to construction, operation, maintenance and security of the power facility.

5.3 Reclamation may contract with another person or entity, in consultation with the Association, for obligations described herein. All costs, including Reclamation's actual costs for administering the contract(s), shall be paid by the Association.

5.4 Reclamation shall establish a specific account (Federal Account) to received funds advanced by the Association.

5.5 Reclamation shall provide a monthly accounting of its expenses for work performed to establish and implement the LOPP.

6. ASSOCIATION'S SCOPE OF WORK

6.1 The Association shall provide Reclamation with a representative to participate on the LOPP negotiating team.

6.2 The Association shall assist Reclamation, as requested, with completion of activities required to comply with NEPA, ESA, NHPA, and other applicable Federal laws as required.

6.3 The Association shall assist Reclamation in arranging public involvement, including meeting places and notices to the public, if so determined to be necessary by Reclamation for NEPA compliance.

6.4 The Association shall pay all costs in the manner described in Article 10, herein. Reclamation has estimated the costs associated with NEPA compliance and other tasks listed in Exhibit A to be $70,000. Upon execution of this Agreement and prior to initiation of required tasks by Reclamation, the Association shall advance to Reclamation the estimated costs associated with the completion of such tasks. The Association shall make an initial deposit into the Federal Account in the amount of $40,000. At such time when the balance in the Federal Account is anticipated to be reduced to $10,000 or less, Reclamation will request additional deposits be made into the Federal Account. The Association shall deposit the requested funds into the Federal Account within 30 days of receipt of the request.

6.5 The Association shall provide a timeline schedule, for completing the necessary steps to execute the LOPP and begin construction.

7. TERM OF THE AGREEMENT

7.1 The date of execution for this Agreement shall be the date this Agreement is signed by the Regional Director.

7.2 This Agreement shall be effective for a period of 15 months from the date of execution, or until either execution of the LOPP contract, or the Association ceases to pursue a LOPP contract.

8. TERMINATION

8.1 Either party may terminate this Agreement with 30 days written notices to the other party.

9. MODIFICATION(S) TO THE AGREEMENT

9.1 Either party may formally request modification of this Agreement. Modifications shall be made by mutual consent of the parties by the issuance of a written modification to this Agreement, signed and dated by the parties, to any changes being performed.

10. BUDGET AND METHOD OF PAYMENT

10.1 In order to comply with 43 U.S.C. 395 Contributed Funds Act of March 4, 1921, Reclamation will issue written requests to the Association for advancement of funds to be deposited into the Federal Account (Article 5.5, herein). Requests for deposits will include work estimates for the deposits requested. Reclamation will not perform any work until adequate funds are available in the Federal Account. The Association will be allowed 30 days from the date it receives a request to make the requested deposits. The fund amount will be based upon the estimate shown on Exhibit A. If the estimate does not cover all of Reclamation's costs, Reclamation will request additional funds from the Association in advance of continuing work.

10.2 If this Agreement is terminated prior to execution of a LOPP (Article 8.1, herein), or if this Agreement is no longer in effect (Article 7.2, herein), remaining funds deposited in the Federal Account (Article 5.5, herein) shall be returned to the Association within 30 days of the date of termination or of the first day when the Agreement was no longer in effect.

10.3 Upon the execution of a LOPP, remaining funds deposited in the Federal Account (Article 5.5, herein) shall remain in the Federal Account. The Federal Account shall be maintained and the funds deposited in this account shall be utilized to pay Reclamation's costs associated with administering the LOPP during the term of the LOPP.

11. NOTICES AND AUTHORIZED REPRESENTATIVES

11.1 Any and all notices required to be given by parties hereto, unless otherwise stated in this Agreement shall be in writing and be deemed communicated when mailed in the United States mail, certified, return receipt requested, addressed as follows:

To Uncompahgre Valley Water Users Association

Mr. Steve Fletcher, Manager
PO Box 69
Montrose CO 81402

To Bureau of Reclamation

Mr. Richard Clayton, General Engineer
Upper Colorado Regional Office
125 South State Street, Room 6107
Salt Lake City UT 84138-1102

The parties may change their address for the purpose of this section by giving written notice of such change to the other in the manner herein provided.

12. GENERAL PROVISIONS

12.1 Nothing herein shall be construed to obligate Reclamation to expend or involve the United States of America in any contract or other obligation requiring funding.

12.2 No Member of or Delegate to the Congress, Resident Commissioner, or official of the Association shall benefit from this Agreement other than as a water user or landowner in the same manner as other water users or landowners.

12.3 Any information furnished to Reclamation, under this Agreement, is subject to the Freedom of Information Act (5 U.S.C. 552).

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the last date written below.

Bureau of Reclamation
United State Department of the Interior

By: _____
Larry Walkoviak, Regional Director
Upper Colorado Regional Office

_____
Date

Uncompahgre Valley Water Users Association

By: _____
Ray Schmalz, President

_____
Date

EXHIBIT A

Work provided by the Bureau of Reclamation in the development and construction of the hydro-powerplant on the M & D Lateral at Shavano Falls, within the Uncompahgre Project boundary.

Advancement estimates:

Description	Cost ($)
Negotiation and Development of Lease	25,000
Planning and Design Technical Assistance	4,000
NEPA Review	25,000
Travel – Region	5,000
Contingencies	11,000
TOTAL ADVANCEMENT ESTIMATES	$70,000

Appendix B – UVWUA Board Resolution

George Etchart moved the adoption of the following resolution:

RESOLUTION

"Be it resolved, that for the purpose of its continued effort to pursue the development of hydro power in the Uncompahgre Valley, the Uncompahgre Valley Water Users Association does approve, ratify and confirm that:

1) Steve Fletcher, Manager, and Ed Suppes, Assistant Manager have the legal authority to enter into an agreement with the Bureau of Reclamation for financial assistance provided under the WaterSMART Grant Program;
2) Mr. Fletcher and /or Mr. Suppes have reviewed and fully support the WaterSMART grant application submitted;
3) The UVWUA/Shavano Falls Hydro LLC has the capability to provide the amount of funding and /or in-kind contributions specified in the funding plan; and
4) The UVWUA will work with Reclamation to meet established deadlines for entering into a cooperative agreement.

Be it further resolved that the Board of Directors affirms that this resolution is adopted with knowledge of the written request.

The Motion was seconded by Todd Stewart and approved by a vote of 5 to 0. Done this 16th day of December, 2013.

Attest:

Secretary

President

Appendix C – Letter of Commitment UVWUA

LETTER OF COMMITMENT

January 23, 2014

To whom it may concern:

Uncompahgre Valley Water Users Association (UVWUA) is committed to developing clean, renewable energy in the federal Uncompahgre Project Area (UPA) of western Colorado.

The UVWUA plans to utilize WaterSMART funds to construct a 2.8MW hydroelectricity facility at an existing irrigation canal drop on the M&D Canal known as Shavano Falls which is located approximately 6.8 miles west of Montrose, Colorado.

The proposed project has multiple benefits including providing a local source of green energy to the community of Delta, Colorado, while also allowing Reclamation and the UVWUA to have better control of water going through the UPA for the benefit of endangered species via automation and remote monitoring. In addition, canal lining and piping improvements associated with the hydroelectric project will reduce delivery system water losses due to leakage and prevent salinity loading to the Colorado River. Improved canal control and delivery system reliability may also improve on-farm irrigation water management in areas with high selenium soils served by the M&D Canal.

The UVWUA will contribute cost-share to the project via in-kind services in the amount of $153,894.60. Funds are currently available with no time constraints and no other contingencies associated with the funding.

Sincerely,

Steve Fletcher
Manager
Uncompahgre Valley Water Users Association

Appendix D – Letter of Commitment Shavano Falls Hydro LLC

SHAVANO FALLS HYDRO, LLC

LETTER OF COMMITMENT

January 23, 2014

To whom it may concern:

Shavano Falls Hydro LLC is aware of and fully supports the Uncompahgre Valley Water Users Association's (UVWUA) application for grant funding through the Bureau of Reclamation's WaterSMART Program.

Shavano Falls Hydro has entered into a partnership with the UVWUA to develop, construct, operate and maintain the 2.8 MW Shavano Falls Hydroelectric Facility located on the M&D Canal in Montrose, Colorado. The owners of Shavano Falls Hydro are Ted Sorenson, P.E. of Sorenson Engineering and Henry (Hank) Stamschror of Mountain States Construction. The owners have over 50 years of combined experience developing, funding, designing, owning and operating small hydro sites.

This project has multiple benefits including providing a clean, renewable source of energy to the local community, improving the management of water flowing through the Uncompahgre Project for the benefit of endangered species, reducing delivery system water losses, improving canal control and delivery system reliability, and other water-quality and water resource benefits.

Shavano Falls Hydro will contribute cost share to the project via a secured loan in the amount of $5,736,000 (75% of capital construction costs) and cash match in the amount of $1,067,408.80. The loan has preliminarily approval and attorneys are currently working on finalizing the necessary paperwork. We expect loan funds to be available by May 2014 with no time constraints and no other contingencies associated with the funding commitment. Cash funds are available immediately with no time constraints and no other contingencies associated with the funding commitment.

Sincerely,

Henry W. Stamschror
Partner

Appendix E – Ag Agreement

Statement of Agreement with Requirements for Agricultural Operations

In accordance with Section 9504 (a)(3)(B) of Public Law 111-11, the Uncompagre Valley Water Users Association agrees to both of the following conditions related to entering into a cooperative agreement for an Improvement to conserve irrigation water in the Uncompahgre Project Area located in Montrose and Delta counties, Colorado:

a) Not to use any associated water savings to increase the total irrigated acreage of the eligible applicant; and
b) Not to otherwise increase the consumptive use of water in the operation of the eligible applicant, as determined pursuant to the Colorado water law.

Steve Fletcher, Manager

1/17/14

Date

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