

# FIRST LEVEL SCREENING - WEEG 2015

APPLICANT NAME: <i>Uncompahgre Valley Water Users Association</i>	CONTROL NUMBER: <i>81</i>
APPLICANT LOCATION: <i>Montrose, CO</i>	TASK AREA: <i>ABC</i>
PROJECT NAME: <i>South Canal Drop 4 Hydropower Development</i>	BOR \$: <i>900,000</i> Cost Share \$: <i>8,252,272</i>

	SCREENING FACTOR	COMPLETE	COMMENTS
1	Eligibility requirements		
	• Eligible applicant in a Reclamation state	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• 50% or more non-Federal cost share	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Authorized funding amount (\$1 Million total - no more than \$500,000 a year)	<input checked="" type="checkbox"/> YES <input checked="" type="checkbox"/> NO	<i>Year-to-year not addressed</i>
	• Funding Group I or II	<input type="checkbox"/> I <input checked="" type="checkbox"/> II	
	• Length of project (9/30/17 - FG I or 9/30/18 - FG II)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<i>12/31/16</i>
2	Proper format and length (75 pages)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
3	Proposal content		
	• SF-424 (authorized signature)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• SF-424B or SF-424D (authorized signature)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Title page	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Table of contents	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	TECHNICAL PROPOSAL/EVALUATION CRITERIA (No More Than 50 Pages)		
	• Executive summary	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Background data	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Technical Project description	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Evaluation Criteria	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Project Benefits/Performance Measures	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Potential Environmental Impact Desc.	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Required Permits/Approvals, if applicable	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	<i>will obtain</i>
	• Letters of Project Support	<input type="checkbox"/> YES <input type="checkbox"/> NO	
	• Official Resolution (Required 30 Days After)	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	PROJECT BUDGET		
	• Funding Plan	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Letters of Funding Commitment	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Budget Proposal	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• Budget Narrative	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	• SF-424A or SF-424C	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	

1<sup>st</sup> Level Screening Comments (Screening Committee Member):

Summary Comments (Grants Officer):

Applicant is eligible for consideration during the Second Level Evaluation phase  Yes  No

*[Signature]*  
Grants Officer

*1/26/15*  
Date

# **South Canal Drop Four Hydropower Development Uncompahgre Project, Colorado**

**A PROJECT PROPOSAL SUBMITTED TO:**

**WaterSMART  
WATER & ENERGY EFFICIENCY GRANT FOR FY 15**

**ON BEHALF OF:**

**UNCOMPAHGRE VALLEY  
WATER USERS ASSOCIATION  
601 NORTH PARK AVENUE  
MONTROSE, COLORADO 81401**

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# I. TECHNICAL PROPOSAL

## A. Executive Summary

January 22, 2014

Applicant: Uncompahgre Valley Water Users Association

Federal Facility: Uncompahgre Project Area

City: Montrose

County: Montrose

State: Colorado

Project Start Date: September 1, 2015

Project Completion Date: December 2016

The Uncompahgre Valley Water Users Association (UVWUA) proposes to construct a 4.8 MW hydroelectric facility on an existing irrigation canal drop structure known as “Drop 4”. Drop 4 is located on the South Canal in the federal Uncompahgre Project Area, approximately 5.2 miles southeast of the town of Montrose, Colorado (Figure 1). WaterSMART Grant Program funds will be used in support of hydroelectric facility construction. The *South Canal Drop 4 Hydropower Development Project*, hereinafter referred to as the *Drop 4* meets the following goals of the WaterSMART FOA by responding to the need for projects that: 1) result in *Water Conservation* (Task A) through associated piping (i.e. penstock) and Automation and SCADA, 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) via canal piping (i.e. penstock) in a canal system serving areas with very high selenium soils that are subject to Endangered Species compliance under the Gunnison Basin Programmatic Biological Opinion.

## B. Background Data

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 by President Roosevelt 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).

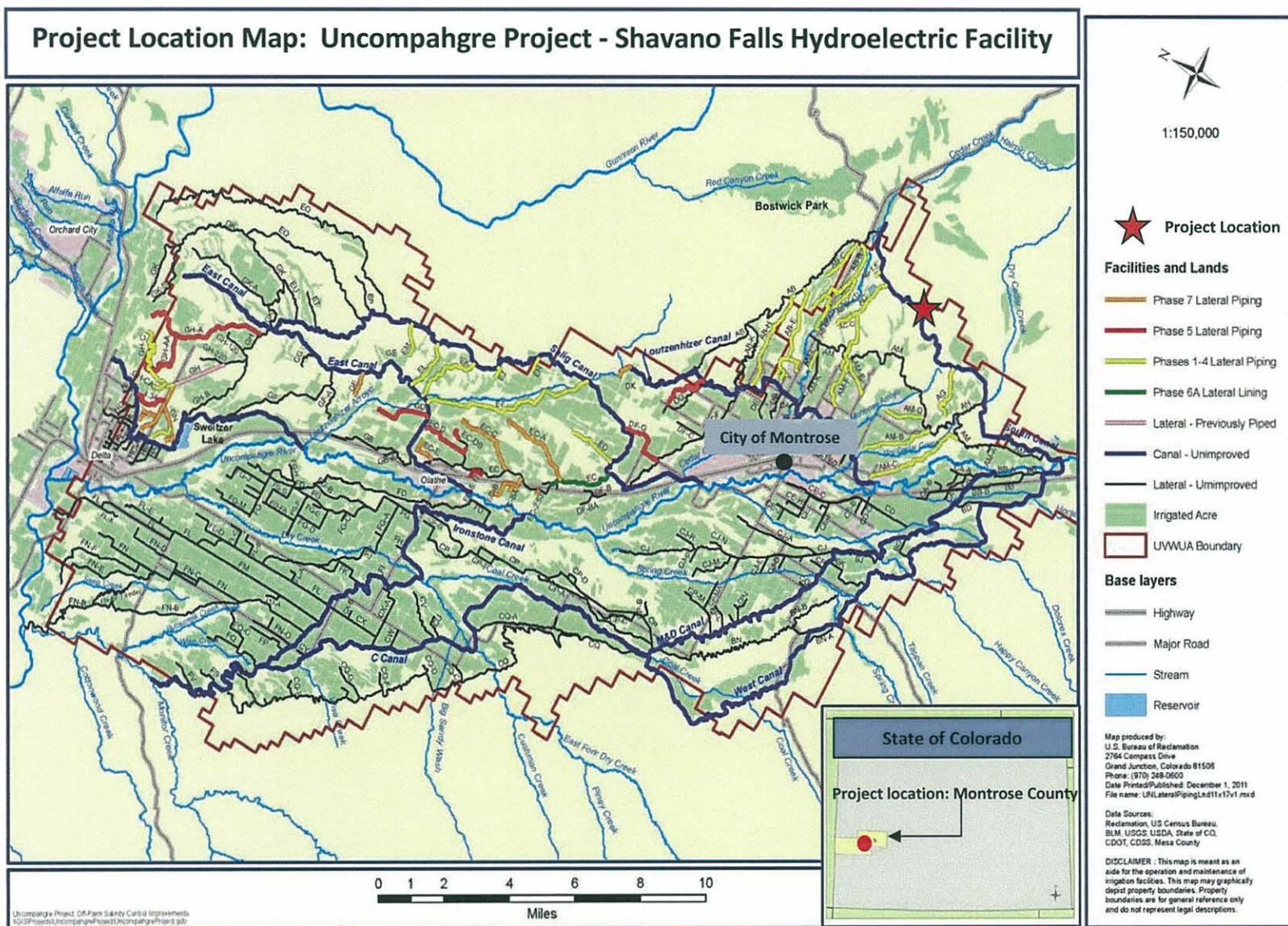
The Uncompahgre Project operates in Reclamation’s Upper Colorado Region and contains one storage dam at Taylor Park Reservoir in Gunnison County, 7 diversion

dams, 128 miles of canals, 438 miles of laterals and 216 miles of drains. Diversion dams in Montrose County include the East Portal of the Gunnison Tunnel on the Gunnison River, 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 three small-scale hydroelectric facilities located on the South Canal at Drops #1 and #3 and on the M&D Canal at Drop #6 (Shavano Falls). Drop #1 produces 3.4 MW while Drops #3 and #6 each produce approximately 2.8 MW.

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) which begins below Crystal Reservoir and feeds 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 85,000 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 2015 (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).

Figure 1. Project Location Map – South Canal Drop 4 Hydroelectric Development, Uncompahgre Project



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 4.8 MW hydropower project at Drop 4 is located in the South Canal approximately 0.8 miles downstream of the existing Drop 3 hydropower project and has approximately 71 feet of fall. The South Canal is located at the opening of the Gunnison Tunnel, approximately 5.2 miles southeast of the town of Montrose, Colorado as shown on Figure 1. It was the first large-volume canal built to transport water from the Gunnison Tunnel for distribution throughout the Uncompahgre Valley.

Construction of the South Canal took place in divisions between 1904 and 1909 (Reclamation Draft EA, 2014). It is 11.4 miles long and was designed to carry 1300 cfs. The South Canal has an absolute decreed water right for 1,175 cfs, a conditional water right for 125 cfs, and an appropriation date of June 1, 1901, for irrigation, municipal and stock water.

The South Canal currently carries up to 1,175 cfs of water directly from the opening of the Tunnel on the Gunnison for about 11.4 miles to the Uncompahgre River and the West Canal System. The South Canal System consists of the Highline-Cedar Valley Lateral and the AB Lateral (UVWUA Water Management Plan, 2013). On average, the South Canal diverts 385,415 ac-ft/year of which approximately 70% reaches the Uncompahgre River for distribution throughout the entire UPA. There are six direct lateral water diversions off the South Canal serving 320 water users and irrigating 13,600 acres in the southeast part of the UPA (UVWUA personal comm., 2014). In addition, the South Canal provides 172 cfs to the West Canal (Alpine Archeological Consultants, 2013; UVWUA personal comm., 2014).

Technically speaking, the South Canal functions to move water from the Gunnison Tunnel for distribution throughout the *entire* Uncompahgre Project Area and provides half of the irrigation water supply needed.

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 2014 the UVWUA has completed 77.10 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 (UVWUA personal comm., 2014). Upon completion of Phase 8, the UVWUA will have prevented an estimated total of 68,676 tons/year of salt and an estimated range of 2,747 to 5,494 pounds/year of selenium from entering the Colorado River with an average 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. 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 8 phased, large lateral piping projects. In addition, the UVWUA has worked with Reclamation on other irrigation delivery system efficiency projects including the Headgate Automation, SCADA and Remote Monitoring Project on the M&D and Ironstone Canals, Uncompahgre Project System Optimization Study Review, and multiple hydroelectric development projects. 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.

Salinity Control 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.

Funding partners:

- 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. – R14AP00005). 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 97.68 miles of laterals will be piped or lined, with 68,676 tons/year of salt and an estimated range of 2,747 - 5,494 lbs/year of selenium controlled.

The UVWUA worked closely with Reclamation to develop and obtain a Lease of Power Privilege (LOPP), has regular minimum monthly communication at scheduled construction meetings, and works closely with Reclamation staff to ensure that all environmental review and compliance processes are followed.

Hydropower projects include the:

- HYDROPOWER DROP 1 – A 3.8 MW hydroelectric plant was constructed on the South Canal during the period of approximately October 2012 through May 2013. LOPP No. 12-07-40-P0310.
- HYDROPOWER DROP 2 – A 1.0 MW hydroelectric plant will be constructed on the South Canal at an existing structure known as Drop 2. Construction is expected to commence October 2015 and continue through April 2016. This project is unique in that it involves the use of the first Archimedes Screw for hydroelectric production in the United States. LOPP No. 15-07-40-P0360.
- HYDROPOWER DROP 3 – A 3.4 MW hydroelectric plant was constructed on the South Canal during the period of approximately October 2012 through July 2013. LOPP No. 12-07-40-P0310.
- HYDROPOWER DROP 4 – A 4.8 MW hydroelectric plant is currently under construction on the South Canal. Construction began September 2014 and is expected to be complete by June 2015. LOPP No. 14-07-40-P0350.
- HYDROPOWER DROP 6 – A 2.8 MW hydroelectric plant is currently under constructed on the M&D Canal and is supported by a WaterSMART Grant entitled *Shavano Falls Hydropower Development Project* (Agreement No. R14AP001007). Construction is expected to be complete April 2015. LOPP No. 14-07-40-P0340.

Irrigation water management projects include the:

- Uncompahgre Project Headgate Automation, Remote Monitoring & SCADA System* – (WaterSMART Agreement No. R13AP40030). The purpose of the project was to implement headgate automation, remote monitoring and SCADA on the M&D and Ironstone Canal during the period 05/01/13 to 12/31/14 to improve irrigation water management (202,457 ac-ft/year).

System Optimization Review/Study plans include the:

- Integrated Assessment, Comprehensive Implementation Planning and System Optimization Analysis for Agricultural Improvements to Reduce Selenium and Salinity Loading in the Uncompahgre Project Area* – (Colorado River District Contract No. C154206). The purpose of the project was to perform a comprehensive analysis, review and systematic plan for integrated on-farm and off-farm efficiency improvement opportunities while minimizing water losses to deep percolation which results in selenium and salinity transport. The plan also incorporated the UVWUA's plans for taking advantage of hydroelectric development opportunities.

### **C. TECHNICAL PROJECT DESCRIPTION**

The UVWUA proposes to construct a 4.8 MW hydroelectric facility on an existing irrigation drop structure on the South Canal known as "Drop 4" 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 South Canal Drop 4 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:**

- **Diversion/Bypass:** A diversion/bypass gate will be placed in the existing channel/canal to divert water into the penstock.

This project proposes to construct an intake structure to convey irrigation water flows parallel to the existing South Canal delivery system through 1,343.8 feet of 120 inch diameter repurposed pipe before producing power through a 4.8 MW hydroelectric facility. Flows will then be returned to the existing canal and will not affect irrigation users (Appendix C – Drop 4 Principal Project Features).

- **Canal System**

The portion of the South Canal in the project area is a deteriorating concrete flume structure built in the mid 1930's which services the UVWUA.

- **Intake Channel**

The intake channel will be adjacent to the existing canal at the upstream end of the project. It will be approximately 900 feet in length. Combined in the intake channel is the overflow structure which will consist of five 10' wide automatic trip gates (ATG) that 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 deliver the required flows. The diversion will consist of a 12' wide by 15.75' high roller gate that will be set in the existing concrete canal too divert water to the intake channel. This gate will also be used as a bypass.

- **Intake Structure**

The intake portion of the structure will be approximately 100' long by 30' wide section of new concrete canal to spread and slow the water before entering a deep intake channel. The water will then cross through a bar trash removal system to remove debris. It will then enter the 120 inch diameter penstock pipe which will deliver the water 1,343.8' downstream to the powerhouse.

- **Powerhouse**

The powerhouse will be a steel and/or concrete building structure with a steel reinforced concrete foundation. The foundation will embed the turbine housing, steel draft tube, and tailrace stop gates. The tailrace stop gates will be used to dewater the unit during maintenance. 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. The tailrace will be approximately 600' in length.

- Turbine

The turbine will be a vertical double regulated Kaplan and will be of American/European design built in China, as will be the generator. The turbine manufacturer is represented by Far East Engineering of Boise, Idaho. These Kaplan units have been installed in the United States by the Twin Falls Canal Company near Hansen, Idaho, the Boise Project Board of Control in Ada County, Idaho and in the Uncompahgre Project at Drops 1 and 3 constructed in 2012.

- Generator

The generator will be a vertical synchronous Kaplan with brushless exciter and a rated capacity of 5000 kW. It will also be of American/European design and built in China.

- Mechanical Equipment

The turbine wicket gates will operate hydraulically. The hydraulic power unit will be of American make – 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.

- Powerhouse Electrical Controls

Powerhouse controls will be of utility grade. The switchgear will be backed by a 125 volt DC service battery system for 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 (e.g. bearing temperature, voltage, etc) from any telephone.

- Substation and Transmission Line

The power will be sold to Delta Montrose Electric Association (DMEA). To reach the interconnect location at the South Canal Drop 3 Project, approximately 1.3 miles of 34.5 kV new overhead transmission line through Bureau of Land Management (BLM) land will be required. A switchyard will be constructed at the powerhouse with a transformer capable of stepping up the power generator at 4,160 V to the interconnection voltage of 34.5 kV.

- Operation & Maintenance

A public-private 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 the maintenance of 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 on the South Canal was available from 1991 through 2012. These daily flows were adjusted (lowered by 10%) due to recalibration from an ultrasonic flow meter installed at the South Canal Drop 1 hydroelectric facility. According to flow records from the UVWUA, approximately 23 cubic feet per second (cfs) is removed between the flow meter and proposed hydroelectric facility. The total number of irrigated acres below the hydroelectric facility has remained constant over the past and is projected to remain constant in the future. Flows in the canal system will not be altered by the hydroelectric facility.

**D. TECHNICAL PROPOSAL: 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 allocated to give consideration to projects that are expected to result in significant water savings.*

**Subcriterion No. A.1: Quantifiable Water Savings**

*Up to 24 points may be allocated based on the quantifiable water savings expected as a result of the project.*

Not applicable.

**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.*

Provide the percentage of total water supply conserved: State the applicant's total average annual water supply in acre-feet. Please use the following formula:

$$\frac{\text{Estimated Amount of Water Conserved}}{\text{Average Annual Water Supply}}$$

Not applicable.

**V.A.2 EVALUATION CRITERION B: Energy Water Nexus (16 points)**

*Up to 16 points may be awarded based on the extent to which the project increases the use of renewable energy or otherwise results in increased energy efficiency.*

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**

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 South Canal Drop 4 Site (<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. The South Canal Drop 4 site ranked #2 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 South Canal Drop 4 Hydroelectric Facility will be constructed at an existing irrigation canal drop. The South Canal at this point carries approximately 877 cfs of irrigation water and gradually drops a vertical distance of 71 feet. A hydroelectric facility will be constructed to capture this previously unutilized renewable energy. The energy capacity of the proposed facility is 4,800 kW (4.8 MW) (Appendix C).

The facility will utilize a Kaplan turbine connected to a vertical 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 17,817,000 kWhr (Figure 2). The energy generation estimate was derived by modeling estimated daily flows in the South Canal at Drop 1 for the period 1991-2012. Flows were then adjusted by 10% based upon recalibration data from an ultrasonic flow meter and decreased by 23 cfs to account for deliveries between the flow meter and the proposed Drop 4 hydroelectric facility location.

Approximately 877 cfs will be directed to the Intake structure during the months of March through October. The water will then flow through 1,343.8 feet of repurposed penstock pipe and fall 71 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 are located by the South Canal near the Drop 3 Hydroelectric Facility. In order to reach the Interconnect, approximately 1.3 miles of 34.5 kV new overhead transmission line will be required through BLM property. A switchyard will be constructed at the powerhouse with a transformer capable of stepping up the power generated to 4,160 V to the interconnection voltage of 34.5 kV. Power produced by the project will be wheeled by Delta Montrose Electric Association (DMEA) to the Municipal Energy Association of Nebraska (MEAN).

Figure 2. South Canal Drop 4 Annual Energy Generation

Drop 4- Montrose Hydro Energy in Megawatt Hours													
Year	Total Generation Per Month												Annual
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Total
1991	1,695	-	-	-	-	-	690	2,326	2,953	2,987	2,904	2,179	15,732
1992	1,855	55	-	-	-	-	443	2,827	2,771	2,982	2,963	2,596	16,491
1993	2,054	304	-	-	-	289	1,548	1,856	2,066	2,980	3,051	2,601	16,748
1994	1,415	-	-	-	-	413	2,534	3,003	2,996	3,073	2,984	2,368	18,787
1995	1,526	245	-	-	-	-	1,340	2,112	1,668	1,829	3,034	2,798	14,552
1996	1,516	81	-	-	-	470	2,852	3,085	3,038	3,119	3,084	2,704	19,949
1997	1,478	-	-	-	-	-	-	1,535	1,813	2,953	2,880	2,287	12,947
1998	2,008	-	-	-	-	826	1,934	2,457	2,927	3,000	3,025	2,674	18,852
1999	1,393	45	-	-	-	670	2,775	2,764	2,935	3,028	3,041	1,935	18,585
2000	2,178	-	-	-	-	564	2,588	2,795	2,917	3,130	3,059	2,799	20,030
2001	1,907	-	-	-	-	555	2,645	2,976	2,904	3,036	3,035	2,835	19,893
2002	934	-	-	-	-	399	2,694	3,065	2,973	3,058	2,982	1,886	17,990
2003	1,755	-	-	-	-	230	2,341	2,574	2,391	3,144	3,086	2,366	17,887
2004	1,122	-	-	-	-	206	1,851	2,522	2,785	3,303	3,303	2,810	17,903
2005	1,889	-	-	-	-	228	2,443	2,776	2,673	3,034	2,880	2,793	18,716
2006	1,884	-	-	-	-	69	2,448	3,027	2,947	2,894	2,744	2,453	18,465
2007	1,810	-	-	-	-	-	1,563	2,601	2,394	2,924	2,846	2,565	16,703
2008	2,220	-	-	-	-	-	1,016	2,722	2,224	2,771	3,073	2,906	16,932
2009	2,460	-	-	-	-	328	1,915	2,726	2,821	3,172	3,184	2,998	19,604
2010	2,468	-	-	-	-	-	1,915	3,016	2,619	3,248	3,116	2,889	19,271
2011	2,531	-	-	-	-	-	1,915	3,088	2,840	2,737	3,125	2,928	19,164
2012	-	-	-	-	-	-	2,493	3,135	3,033	2,943	2,476	2,192	16,272
2013	1,697	-	-	-	-	-	1,564	3,283	3,148	3,212	2,998	2,402	18,305
<b>Average</b>	1,778	36	-	-	-	262	1,877	2,638	2,641	2,983	3,014	2,572	
													<b>Yearly Average MW-hours</b>
													<b>17,817</b>

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 Drop 4 Hydroelectric Facility can replace energy generated from fossil fuel or coal. The Drop 4 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 2012 “the average annual electricity consumption for a U.S. residential utility customer was 10,837 kWh...” (<http://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3>).

With an average annual energy generation of 17,817,000 kWhr, the Drop 4 Hydroelectric Facility would provide enough clean energy to power 1,644 homes each year. In addition,



approximately 32,000,000 to 34,000,000 lbs of CO<sub>2</sub> would be removed 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<sub>2</sub> that could be removed annually for the average U.S. household utilizing steam-electric generators in 2012 for the specific fuels identified (<http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11>).

**Table 1. South Canal Drop 4 Hydroelectric Development: Associated Carbon Reduction**

Fuel	Lbs of CO <sub>2</sub> per Million Btu	Heat Rate (Btu per kWh)	Lbs CO <sub>2</sub> per kWh	Lbs of CO <sub>2</sub> removed when using clean energy
Coal				
Bituminous	205.300	10,107	2.08	32,747,520
Sub-bituminous	212.700	10,107	2.16	34,007,040
Lignite	215.400	10,107	2.18	34,321,920

Last updated: April 17, 2014 (<http://www.eia.gov/tools/faqs/faq.cfm?id=74&t=11>)

**Environmental Benefit #2:** The piping of the antiquated cement lined section of the South Canal Delivery System (portion in penstock pipe) will have water conservation benefits (*Task A*) and is consistent with system optimization planning and implementation efforts occurring throughout the UPA for water-quality, water resource and endangered species benefits (e.g. 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 activities associated with this hydroelectric development project will result in the elimination of 77 ac-ft/year of delivery system water loss, 441 tons/year of salt and 44 lbs/year of selenium controlled (Table 2). Seepage and salt load reduction estimates were developed by Reclamation for the UPA and are based upon “the 1982 Lower Gunnison Basin Unit Hydrosalinity Model and Coll Stanton’s work for the 1995 preconstruction report” (personal communication, Reclamation). According to the Gunnison Basin Selenium Task Force, selenium reduction estimates are based upon previous studies done in the area by USGS on the associated benefits of piping irrigation laterals (Butler, 2001) and are 0.10 lbs of selenium per ton of salt controlled. Figure 3 on pg.16 shows the location of the project within soils of *very high* selenium soil mobilization potential.

According to Reclamation’s 2002 report entitled *Canal Lining Demonstration Project, 10 Year Final Report*, concrete lined canals such as the South Canal have a 40-60 year durability and a 70% effectiveness at seepage reduction. Based upon visual observation and given that the Drop 4 section of the South Canal was lined in 1935 and therefore close to 80 years old, it’s effectiveness at seepage reduction is estimated to be closer to 30%. Using this information, its estimated annual benefits are 77 ac-ft of seepage reduced, 441 tons of salt and 44 lbs of selenium controlled.

**Table 2. Drop 4 Hydroelectric Facility: Estimated Seepage, Salt & Selenium Reduction**

Delivery System Identification	Total Length (ft)	Annual Seepage (ac-ft)	Annual Salt Loading (tons)	Annual Salt Loading (tons/mi)	Length Section Proposed Improved (ft)	Annual Seepage Controlled (ac-ft)	Annual Salt Controlled (tons)	Annual Range Se Controlled (lbs)
South Canal A – Drop 4 Site (existing concrete lined at 30% effectiveness)	40,660	2,344	13,336	1,732	1,343.8	23	132	13
South Canal A – Drop 4 Site (improved pipe)					1,343.8	77	441	44

- 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, transmission line loss is avoided when outside energy does not have to be brought in to an area. Energy generated by the Drop 4 Hydroelectric Facility 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.

AND/OR

**SUBCRITERION No. B.2: Increasing Energy Efficiency in Water Management**

None.

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

*Up to 12 points may be awarded for projects that will benefit federally recognized candidate species or up to 12 points may be awarded for projects expected to accelerate the recovery of threatened or endangered species, or addressing designated critical habitat.*

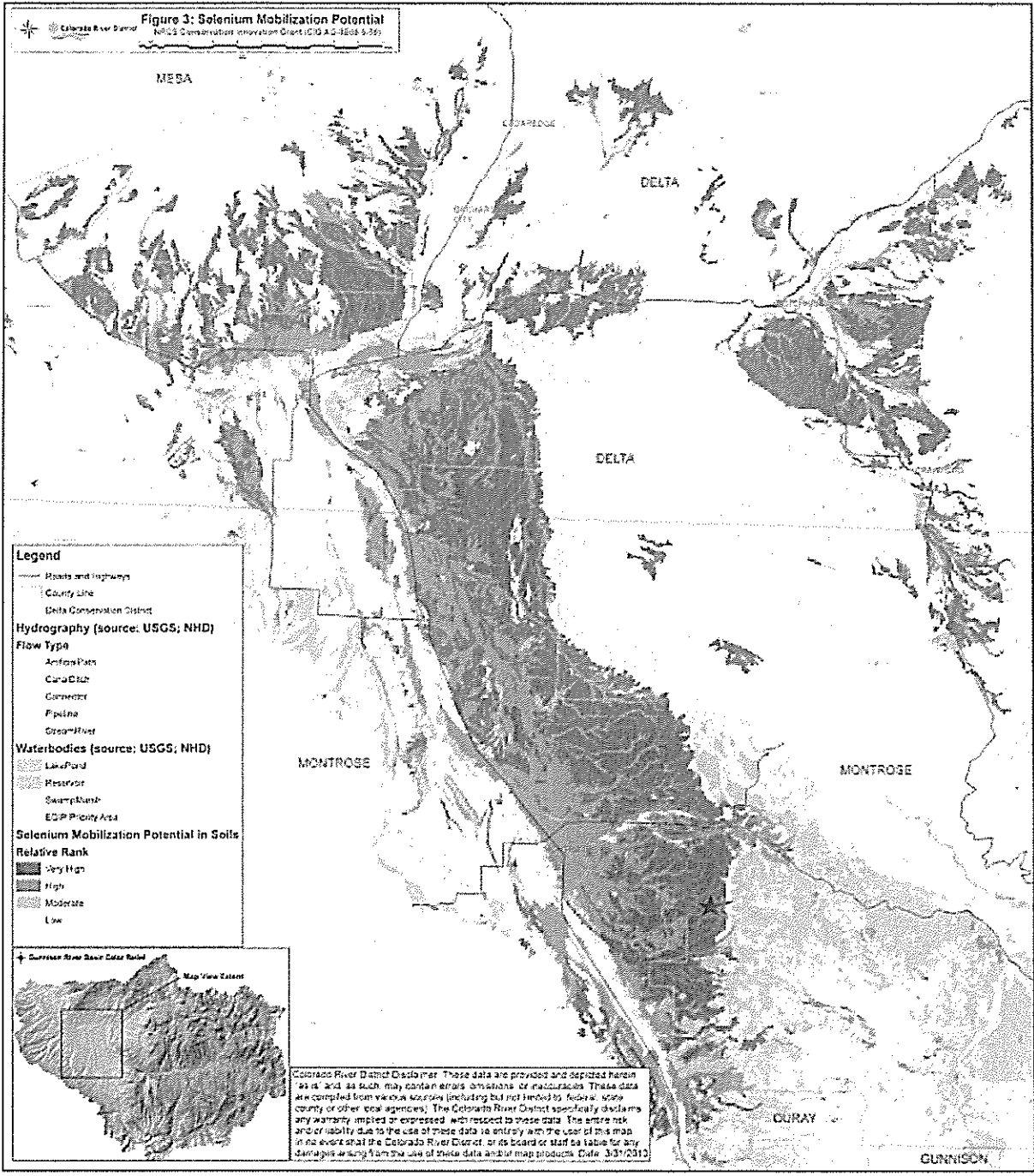
For projects that will directly benefit *federally-recognized candidate species*, please include the following elements:

- 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).

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

*Benefits to Gunnison Basin Programmatic Biological Opinion (PBO) for Endangered Fish 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 UUVUA to have better control of water going through the UPA. This project increases the resiliency of the UUVUA 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. Irrigation system optimization planning in the UPA is complete and implementation is currently underway with the goal 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. One of the primary optimization efforts includes the piping (or lining) of irrigation laterals and canals to reduce seepage and associated selenium loading to critical habitat in the Gunnison and Colorado Rivers. This project is found in some of the highest selenium soil mobilization potential areas in the UPA (Figure 3). The piping of irrigation flows associated with this project has direct benefits of 44 lbs selenium reduction per year.



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 UPA 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) (See Figure 3 above). The South Canal Drop 4 hydro site provides water to the entire UPA and is located in an area with "very high selenium soil mobilization potential." Piping projects reduce selenium loading to the Gunnison and Colorado Rivers by keeping delivery system water out of contact with the soils thus preventing mobilization. These two rivers serve as critical habitat to four endangered fish species (two in the Gunnison Basin)

(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 benefits Colorado River endangered fish species (Colorado pikeminnow and razorback sucker) through selenium reductions in critical habitat due to the piping of irrigation flows to the hydroelectric unit, improved water management via headgate automation and SCADA and improved control of water flowing through the UPA as part of Aspinall Unit Re-operations for endangered species.

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

Up to 12 points may be awarded for projects that propose developing a new water market.

Not applicable.

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

*Up to 14 points may be awarded for projects expected to contribute to a more sustainable water supply. This criterion is intended to provide an opportunity for the applicant to explain 1) how the project relates to a completed WaterSMART Basin Study; 2) how the project could expedite future on-farm improvements; 3) how the project will build resiliency to drought; and or 4) how the project will provide other benefits to water supply sustainability with the basin. An applicant may receive the maximum of 14 points under this criterion based on discussion of one or more of the numbered sections below.*

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

- 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 77 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) Directing South Canal flows to the 1,343.8' of steel *penstock pipe* in order to generate hydropower over Drop 4 will result in the elimination of 77 ac-ft/year of seepage loss historically associated with this portion of the unimproved canal;
- 2) *Headgate automation, remote monitoring and trash screens* associated with the hydroelectric facility 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 the elimination of canal spills; and
- 3) Finally, *headgate automation and remote monitoring* allow the UVWUA to have better control of water during storm events by allowing water to pull behind the intake and slowly release rather than having it race down the South Canal and cause spills/overtopping and flooding in residential areas.

The following related adaptation strategies were found in the Basin Study that relate to hydropower 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, but later studies such as the *Site Inventory and Hydropower Energy Assessment of Reclamation Owned Conduits* published in March 2012 clearly demonstrate the goal and intent of Reclamation “to provide the nation with affordable, reliable and environmentally sustainable hydropower.”

- 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 cement lined, but antiquated (lining is over 80+ years old), canal delivery system that leaks. Saved 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 reduces “bounces” in the delivery system, improves canal control on a daily basis and during storm events, and provides reliable and stable water supplies that 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).

- 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.

- Describe whether the project will result in further collaboration among Basin Study partners.

The South Canal Drop 4 Hydropower Development Project has resulted in significant collaboration among Basin Study partners.

Over the past year, 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 implement various aspects of the Uncompahgre Project System Optimization Study. The purpose of the study was 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.

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

*Up to 14 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.*

If the proposed projects will help expedite future on-farm improvements please address the following:

Not directly explored.

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

*Up to 14 points may be awarded for projects that will build long-term drought resilience in an area affected by drought.*



If the proposed project will make water available to alleviate water supply shortages resulting from drought, please address the following:

This project has associated benefits that will address/help alleviate shortages resulting during drought and are explained below.

- Explain in detail the existing or recent drought conditions in the project area. Describe the severity and duration of drought conditions in the project area. Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by drought.

Over the past 15 years, the Lower Gunnison Basin has experienced several intense droughts, the last occurring in 2012. 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. 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.

- Describe the impacts that are occurring now or are expected to occur as a result of drought conditions. Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought. For example, will the proposed project prevent the loss of permanent crops and/or minimize economic losses from drought conditions? Will the project improve the reliability of water supplies for people, agriculture, and/or the environment during times of drought?

Please also see the section above for the impacts occurring or expected to occur.

The canal automation and remote monitoring aspects associated with this hydropower project respond to climate variability by improving the UVWUA's ability to accurately measure and monitor water supplies coming from the Gunnison River.

The piping aspects associated with this hydropower project have a positive benefit on water supplies during times of drought in that the efficiency of the penstock pipe is far greater than the current, aging concrete lined structure in the by-pass which was built during 1935-36. By eliminating delivery system losses additional water can be provided to downstream UPA users during times of drought.

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

*Up to 10 points may be awarded for projects that include other benefits to water supply sustainability.*

Projects may receive up to 10 points under this subcriterion by thoroughly explaining additional project benefits, not already described above. Please provide sufficient explanation of the additional expected project benefits and their significance. Additional project benefits may include, but are not limited to, the following:

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

(a) Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?

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 depending upon the study/resource consulted. The Colorado River Basin is over-allocated.

In addition, there is significant pressure on the Gunnison Basin to address issues with water shortages on the eastern slope of Colorado on the Front Range via trans-basin diversions and within the Upper Colorado River system to help address downstream water shortages in California, Nevada, Arizona, Mexico, etc. (Lower Colorado River Basin). Any project that helps to address water resource shortages are a benefit to the basin. Canal automation aspects of this project help to maintain stable water levels which improve on-farm efficiency, remote monitoring greatly improve the ability of the UVWUA to accurately measure deliveries and respond prevent canal spills at the headgates and piping

(b) Describe how the water source that is the focus of this project (river, aquifer, or other source of supply) is impacted by climate variation.

The Lower Gunnison Basin has experienced several intense droughts over the past 15 years (2002, 2003, and 2012) which has resulted in calls being placed on junior water right holders on the Gunnison River and/or significant negotiations to avoid calls.

(c) Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved.

The Gunnison Basin has been issued a Programmatic Biological Opinion (PBO) and Record of Decision (ROD) which requires Gunnison Basin water users and stakeholders to address selenium concentrations and endangered fish species concerns resulting from on-going irrigation practices. During times of drought when there is less dilution water available, selenium concentrations increase in critical habitat. Water users within the basin are very concerned about potential ESA conflicts.

● Will the project make additional water available for Indian tribes?

No.

● Will the project make more water available for rural or economically disadvantaged communities?

No.

● Does the project promote and encourage collaboration among parties?

a) Is there widespread support for the project?

Yes.

b) What is the significance of the collaboration/support?

There is widespread support for the Drop 4 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, better control of water in the Uncompahgre).

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.

The UVWUA, along with other lower Gunnison basin stakeholders, was recently notified that they were selected from among 210 applicants for a Natural Resource Conservation Service (NRCS) – Regional Conservation Partnership Program (RCPP) grant. This grant encourages and includes support for small scale hydro-electric development in the Lower Gunnison Basin and is focused on coordination of on- and off-farm improvements.

c) 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 of flows in the canals which prevents seepage losses (and selenium and salt loading to the Colorado River System); 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.

d) 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.

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

No.

● Will the project increase awareness of water and/or energy conservation and efficiency efforts?

Yes.

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

Absolutely. 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 South Canal Drop 4 Hydropower Development Project is also important in that the power generated benefits the 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 Drop 1, 3, and 6 (Shavano Falls).

b) 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.

c) 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)**

**Subcriterion No. F.1: Project Planning** - Does the project have a Water Conservation Plan, System Optimization Review (SOR), and/or district or geographic area drought contingency plans in place? Does the project relate/have a nexus to an adaptation strategy developed as part of a WaterSMART Basin Study? Please self-certify, or provide copies of these plans where appropriate, to verify that such a plan is in place.

Provide the following information regarding project planning:

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

- A) UPA Water Management Plan (WMP) (2014)
- B) UPA System Optimization Review & SCADA Analysis (2014)
- D) Gunnison Basin Selenium Management Program Formulation Document (SMP) (2011)
- E) Gunnison Basin & Grand Valley Selenium Watershed Management Plan (SeWMP) (2012)
- F) SMP Selenium Science Plan (2014)
- G) Reclamation's Sustainable Energy Mission
- H) President's Climate Action Plan 2013
- I) Reclamation's 2011-2016 Strategic Plan

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

**UPA WATER MANAGEMENT PLAN (WMP):** The UVWUA certifies that it has an up-to-date WMP. The plan has been submitted to the Western Colorado Area Office in Grand Junction. This project addresses water management goals and objectives identified in the WMP including: 1) continuing to develop hydropower in the Uncompahgre Project where feasible, 2) implementing headgate automation for improving water delivery and administration, and 3) piping laterals on the east and west sides 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 was completed July 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](http://www.seleniumtaskforce.org/images/LG_GV_Se_Watershed_Plan_Final_v.12-19-12.pdf)

SMP SELENIUM SCIENCE PLAN: The Se Science Plan was completed by SMP Science Team and approved by the full SMP Work Group (2014). The Science Plan guides the SMP in identifying and implementing studies which support the goal of understanding selenium mobilization, transport and fate. The UVWUA has used products of scientific studies to help target specific areas for remediation (e.g. Se Soil Mobilization Potential Maps and LOADEST Models). In addition, the UVWUA works closely with science partners to help with operation and maintenance of water-quality monitoring gages within the UPA and to provide access agreements and permission to conduct studies on UPA property. The document is not available via the web at this time. For more information please contact Brent Uilenberg of the WCAO in Grand Junction ([builenberg@usbr.gov](mailto:builenberg@usbr.gov))

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

#### **Subcriterion No F.2 – Readiness to Proceed**

• *Describe the implementation plan for the project.*

All environmental compliance and evaluation processes have been completed and the UVWUA received "Approval to Begin Construction" from Reclamation on September 9, 2014. Table 3 below summarizes the implementation plan and identifies the project schedule showing the stages and duration of the proposed work including major tasks, milestones and dates.

• *Please explain any permits that will be required, along with the process for obtaining such permits. Identify and describe any engineering or design work performed specifically in support of the proposed project.*

The construction of the Drop 4 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. Reclamation served as the lead federal agency for determining NEPA compliance and evaluating all technical information.

• T&E Plant Survey: The UVWUA hired Bio-Logic, Inc. to complete an endangered and/or threatened plant species 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 completed a T&E animal survey for the project as part of their NEPA Compliance assistance.

•Environmental Assessment: The Bureau of Reclamation Western Colorado Area Office completed an environmental assessment for the Drop 4 Hydropower Development Project. A Categorical Exclusion Checklist (CEC) was completed by Reclamation.

2) Clean Water Act (CWA) Compliance: An evaluation was conducted by Reclamation and it was determined that there was “no impact” to wetland and riparian resources.

3) National Historic Preservation Act (NHPA) Compliance: A Class III cultural resources inventory of the Drop 4 project area was completed by Alpine Archeological Consultants Inc., in October of 2013. Reclamation completed consultations with the Colorado State Historical Preservation Office under Section 106 of the NHPA. All occurrences will be mitigated or avoided. Copies can be provided upon request.

4) Lease of Power Privilege (LOPP): The UVWUA worked directly with Reclamation to obtain a LOPP & Funding Agreement from Reclamation (See Appendix A).

5) Other Agreements or Easements: With the exception of the interconnection line which crosses BLM land, the Drop 4 Hydro Project is situated entirely within Reclamation lands. An MOA exists between Reclamation and BLM for the interconnection line.



**Table 3. Milestones, Performance Measures and Schedule - Drop 4 Hydropower Project**

TASK	2014				2015				2016				Milestones & Dates
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1. Obtain a Lease of Power Privilege (LOPP) from the Reclamation	[Timeline: Q1-2014 to Q4-2014]												Final signed LOPP (Sept 8, 2014)
a. Pre-application document and notice of intent	[Timeline: Q1-2014 to Q1-2014]												Completed
b. Agency consultation and study plan development	[Timeline: Q1-2014 to Q2-2014]												Complete
c. Impact studies	[Timeline: Q1-2014 to Q2-2014]												Complete
i) Rare plant survey (NEPA)	[Timeline: Q1-2014 to Q2-2014]												Complete
ii) Environmental assessment (NEPA)	[Timeline: Q1-2014 to Q2-2014]												Complete
iii) Archeological survey (NHPA)	[Timeline: Q1-2014 to Q1-2014]												Complete
d. Draft license application	[Timeline: Q1-2014 to Q2-2014]												Complete
e. Final license application	[Timeline: Q2-2014 to Q3-2014]												Complete
2. Approval to start construction	[Timeline: Q4-2014 to Q4-2014]												Approval letter received on Sept 9, 2014
3. Construction	[Timeline: Q1-2015 to Q4-2015]												Phot Documentation of All
a. Powerhouse	[Timeline: Q1-2015 to Q2-2015]												Feb-15
b. Tailrace	[Timeline: Q1-2015 to Q2-2015]												Dec-14
c. Intake/Forebay	[Timeline: Q1-2015 to Q2-2015]												Jan-15
d. Penstock delivery and installation	[Timeline: Q1-2015 to Q2-2015]												Dec-14
e. Delivery of turbine/generator	[Timeline: Q2-2015 to Q2-2015]												Mar-15
f. Complete turbine/generator installation	[Timeline: Q2-2015 to Q3-2015]												Apr-15
g. Complete mechanical/electrical auxiliaries	[Timeline: Q2-2015 to Q3-2015]												Jun-15
h. Complete transformer, substation, transmission line structures	[Timeline: Q3-2015 to Q4-2015]												Jun-15
4. Testing	[Timeline: Q4-2015 to Q4-2015]												Apr-15
5. Completion	[Timeline: Q4-2015 to Q4-2015]												Jun-15

<sup>1</sup> Areas shaded in gray are those activities which will/have commenced prior to WaterSMART grant funding announcements.

<sup>2</sup> Timeline is represented in federal fiscal year (October-September).

Design and engineering work performed specifically in support of this project was conducted by Sorenson Engineering of Idaho Falls, Idaho. All project designs were reviewed and approved by Reclamation prior to authorizing construction. Conceptual and final design were developed for all elements of the project including the canal system, intake channel, intake structure, tailrace, powerhouse, turbine, generator, mechanical equipment, powerhouse electrical controls, and the substation and transmission line. In addition, Sorenson Engineering gathered hydrological data and modeled energy generation projections for the project.

## II. 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 Drop 4 Hydropower Development Project:

● **Performance Measure No. A: Projects with Quantifiable Water Savings**

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

Canal lining and lateral piping implementation associated with the Drop 4 Hydroelectric Development Project will result in the reduction and/or elimination of seepage and salt loading occurring from the existing, open, aging lined canal structure due to the penstock piping (Estimated at 77 ac-ft and 441 tons of salt per year). U.S. Bureau of Reclamation seepage estimates are based upon information developed in the *1982 Lower Gunnison Basin Unit Appendix B Hydrosalinity Model* and based in some areas 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 14 of this proposal summarizes salt seepage number received from the Bureau of Reclamation.

The UVWUA proposes to document the benefits of canal piping on reducing delivery system water losses by comparing existing seepage rates for the South Canal provided by the Bureau to approved seepage estimates for the existing cement lined structure adjusted for its current efficiency at 80 years old and then comparing to the efficiency of a newly piped system. Steel penstock pipe is estimated to be 100% efficient and has a 50 year life expectancy or greater.

a) Seepage reduction due to canal piping.

Pre-project: Document existing canal efficiency estimates for seepage loss using Reclamation model.

Post-project: Estimate post-project seepage in the new 1,343.8' section of steel penstock pipe using Reclamation piping efficiency effectiveness numbers.

Measure No. A.2: Measuring Devices – Not applicable.

Measure No. A.3: SCADA and GIS

Current plans are to access data from the hydropower site via automatic computer (unmanned) control at the plant, fitted with a dial-in signal to allow remote monitoring of the plant including critical variables (temperature, voltage, etc.), from any 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 via computer. 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 a problem. The dialer continues to call the numbers until an individual answers.

#### Measure No. A.4: Automation

Canal water level stability is enhanced with the implementation of automation. The South Canal Drop 4 hydroelectric plant will be the third hydroelectric facility in operation on this canal stretch. If any of the other hydroelectric plant is off-line for maintenance, subsequent downstream facilities continue to help to regulate flow within the system. If the Drop 4 site goes off-line, irrigation flows would be immediately diverted back into the canal via the historical channel to prevent any disruption to irrigation supplies. In addition, during heavy rain events in this sparsely vegetated area, automation will assist in pooling water in the canal and then releasing it slowly rather than having the water rush down the canal and then having to respond to flooding and or canal overtopping in the lower portion of the system.

a) 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. The system optimization review (SOR) or study of the east side of the Uncompahgre Project Area where this hydroelectric project is located is complete as of July 2014. In addition, a full automation and SCADA system analysis of the Uncompahgre Project is currently underway. A final report is expected by the summer of 2015.

b) Is there potential for automation occurring at the Drop 4 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 in the SOR and are currently undergoing a detailed system wide SCADA review in order to prevent any potential negative operational issues.

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

d) Benefits of Automation: Headgate automation at the Drop 4 Hydroelectric Facility will help maintain stable flows in the lower South Canal system and improve public safety issues associated with canal overtopping/flooding. Because there is no data on delivery system operations spills or management in this area of the South Canal, pre-project performance will be difficult to document. Instead, the UVWUA is proposing to submit the current Uncompahgre Project automation and SCADA system analysis being performed under a separate contract with the Irrigation Training and Research Center at Cal Poly Technical Institute. The analyses will incorporate the benefits of automation along with developing a plan for remote monitoring of all headgates and hydroelectric units in the UPA.

Pre-project: Summary of historical irrigation water management challenges on the South Canal.

Post-project: Copy of Uncompahgre Project remote monitoring and SCADA system analysis and plan which will incorporate hydroelectric units.

Measure No. A.5: Groundwater Recharge (Conjunctive Use) – Not applicable.

Measure No. A.6: Irrigation Drainage Reuse Projects – Not applicable.

Measure No. A.7: Landscape Irrigation Measures – Not applicable.

● **VIII. A.2 Performance Measure No. B: Projects with Quantifiable Energy Savings**

Performance Measure No. B.1: Implementing Renewable Energy Improvements Related to Water Management & 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 on the South Canal was available from 1991 through 2012. These daily flow were adjusted (lowered by 10%) due to recalibration from an ultrasonic flow meter installed at the South Canal Drop 1 hydroelectric facility. According to flow records from the UVWUA, approximately 23 cubic feet per second (cfs) is removed between the flow meter and proposed hydroelectric facility. Measured flows were then combined with UVWUA records of the turn-on and shut-off dates for the South Canal over the last 20 years.

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 Drop 4 Hydroelectric Unit estimate annual energy generation as 17,817,000 kilowatts and can be found in Figure 2 on page 12.

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

By taking annual energy generation estimated at the Drop 4 Hydroelectric Unit (17,817,000) and dividing that by the average annual energy consumption of a U.S. residential utility customer in 2012 (10,837 kWhr), it was determined that 1,644 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 local renewable energy for MEAN to market throughout Colorado (i.e. less transmission line loss), which could then help those agencies reach Renewable Energy Standards. There is existing potential for future power produced from Drop 4 to be used to meet local power demands as demands for power in the Delta-Montrose Energy Association's service territory have been on an ever increasing trend for decades.

Finally, the energy of the water going over Drop 4 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 from the aging canal structure through piping of open flows. Seepage losses were calculated to be 77 ac-ft/year which can now be provided to downstream UPA water users.

By providing energy generated from the plant 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<sub>2</sub> emissions which are harmful to the environment (32,000,000 to 34,000,000 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 17,817 MWhr which is equal to 713 MWhrs annually.

Another way of looking at energy conservation for the project is that the hydroelectric facility has harnessed existing unutilized energy at the Drop 4 site (17,817 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 Drop 4 Hydropower facility is 17,817,000 kWhr per year of clean, renewable energy.

Post-project: Power generation data/reports from the Drop 4 facility supporting the amount of clean energy produced.

- b) Pre-project: Estimate pre-project CO<sub>2</sub> emissions for 17,817,000 kWhr of coal produced energy based upon accepted standards.

Post-project: Estimate post-project CO<sub>2</sub> emission reductions for 17,817,000 kWhr of hydroelectricity produced based upon accepted standards.

#### Performance Measure No. B.2: Increasing Energy Efficiency in Water Management

- 1) Explain the methodology for calculating the quantity of energy savings resulting from the water management improvements or water conservation improvements.

Not applicable.

- 2) Explain the anticipated cost savings.

Not applicable.

#### Performance Measure No. C: Projects that Benefit Endangered Species and/or Critical Habitat

*For projects that benefit federally listed species (threatened and endangered), federally recognized candidate species, or designated critical habitat that are affected by a Reclamation facility, the applicant should consider the following:*

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.

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. In addition, it is difficult to document changes in selenium concentrations at small environmental scales because of complex groundwater hydrologic processes. 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 85<sup>th</sup> 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.). Current unpublished data being gathered USGS at the request of Gunnison Basin Se Management Program stakeholder and Reclamation continues to show a downward trend (Ken Leib, U.S. Geological Survey, personal communication).

- The methodology used for determining the recovery rate of the threatened and/or candidate species.

Because of very complex groundwater processes and pathways, it is extremely difficult to document changes in selenium loading in the field at the scale of this project. One option may be to request a letter from Reclamation environmental compliance staff stating the benefits of piping on selenium reduction toward endangered species compliance as part of Aspinall Unit re-operations EIS and ROD.

- How the project will address designated critical habitats, including acres covered, species present, and how the water savings or transfers are expected to benefit the habitat(s).

There are no known endangered, threatened or candidate species occupying the South Canal Drop 4 site. 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 new water supplies (77 ac-ft/year) that result from associated lateral piping will be left in the irrigation system for use by downstream water users in the UPA. There are no water banks/marketing mechanisms for endangered fish species at this time in the Gunnison Basin.

Benefits to endangered fish species will result from selenium reduction associated with the piping of irrigation flows, automation for control, and improved 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(s).

There were no negative impacts identified by Reclamation with regard to endangered, threatened or candidate species and/or critical habitat.

#### Performance Measure No. D: Projects that Establish a Water Market

- Performance Measure No. D.1: Groundwater Substitution Transfers

Not applicable.

- Performance Measure No. D.2: Crop Shifting or Idling Transfers

Not applicable.

- Performance Measure No. D.3: Other Transfers

Not applicable.

#### **SUBCRITERION No. F.4: Reasonableness of Costs**

Please include information related to the total project cost, annual acre-feet conserved, energy capacity, or other project benefits and the expected life of the improvement(s):

##### South Canal Drop 4 Hydroelectric Development Project

Total Project Cost: \$9,151,252

Reclamation (federal cost): \$900,000

In-kind (non-federal): \$8,251,272

Energy Generated: 17,817,000 kWhrs

CO<sub>2</sub> Emmisions Reduced: 32,000,000 – 34,000,000 lbs

Annual Acre Feet Conserved: 77 ac-ft/year

Selenium Controlled: 44 lbs/year (Endangered Species Benefit)

Salt Controlled: 441 tons/year

Life Expectancy of the Project: 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.7 Evaluation Criterion G: Additional Non-Federal Funding (4 points)**

Up to 4 points may be awarded to proposals that provide non-Federal funding in excess of 50 percent of the project costs. State the percentage of non-federal funding provided.

Non-federal funding / Total Project Cost = \$8,251,272 / \$9,151,272 = 90%

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

*Up to 4 points may be awarded if the proposed project is in a basin with connections to Reclamation project activities. No points will be awarded for proposals without connection to a Reclamation project or Reclamation activity.*



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

The proposed South Canal Drop 4 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 has been 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 ...” where optimization leads reductions in selenium concentrations in endangered species critical habitat. The above SOR was funded through Colorado Species Conservation Trust Funds made available for implementation of SMP activities occurring in the Lower Gunnison Basin. This project will control 44 lbs/year of selenium.
- 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 77.1 miles of lateral piping. This project will control 441 tons/year of salt.
- 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 control allows 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 activities associated with the hydropower development project will eliminate seepage losses to the groundwater system. Additional water supplies resulting from this project will be utilized by water users in the UPA who are most impacted by periods of drought in water short years.

6) Will the project help Reclamation meet trust responsibilities to Tribes?

No.

### **III. Environmental & Cultural Resource 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 construction of a new powerhouse and switchyard and associated access road, the penstock inlet and outlet work within the canal.,

- 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. Existing access roads will be used to access the construction areas. 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 were no downstream water-quality impacts identified by Reclamation with regard to construction of the hydroelectric project. A soil erosion plan will be put into effect.

Water quantity will be unchanged.

- Animal Habitat: Reclamation (WCAO) has conducted an Environmental Assessment which included an assessment of animals and animal habitat affected by the project. No significant impacts were identified.

(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 was conducted by Reclamation's Western Colorado Area Office. No impacts were identified.

(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.

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 irrigation canals or laterals are "not considered waters of the U.S." A copy of the consultation letter can be provided upon request. There were no jurisdictional wetland impacts associated with the construction of the South Canal Drop 4 Hydroelectric Development Project.

4) When was the water delivery system constructed?

Construction of the South Canal took place in divisions between 1904 and 1909 (Reclamation Draft EA, 2014).

(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.

Segment 5MN1851.7 is a 1.2 mile long section of the South Canal. It begins on the north on land administered by BLM at the exit of Tunnel 3 and runs in a southwestward direction to a point below a major drop in the canal. The exit of Tunnel 3 is an arched concrete structure with a concrete lined lintel above. About 725 feet below the tunnel, the channel gradually narrows over a distance of about 50 ft and enters a concrete chute that is 8 ft wide with 6-inch concrete vertical side walls. The chute was built in 1935 as a Public Works Administration project to replace a series of drops that had been difficult to maintain.

The intake channel will be adjacent to the existing canal and will utilize the abandoned Drop 4 alignment. No structures will be removed, but a new intake/bypass headgate will be built in the existing canal to divert the water into the penstock.

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

Yes. Reclamation determined that construction of the Drop 4 hydroelectric facility will adversely impact NRHP eligible cultural resources and has consulted with the State Historical Preservation Office (SHPO). Mitigation for adverse effects includes avoiding the South Canal Construction Camp at Tunnel 3 and completion of photo documentation of the affected portions of the South Canal according to SHPO's Level II standards. A Memorandum of Agreement (MOA) between Reclamation and the SHPO to mitigate effects has been drafted and included in the Final EA. Cultural mitigation measures agreed to in the MOA were completed by UVWUA before construction commenced.

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

At this time, there are no known archeological sites in the proposed area. In the event of discovery of possible cultural or paleontological resources, the UVWUA will immediately cease all ground-disturbing activities in the vicinity and notify Reclamation. Work would not resume until approved by Reclamation.

(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.

The construction of the Drop 4 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. Reclamation served as the lead federal agency for determining NEPA compliance and evaluating all technical information.

- T&E Plant Survey: The UVWUA hired Bio-Logic, Inc. to complete an endangered and/or threatened plant species 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 completed a T&E animal survey for the project as part of their NEPA Compliance assistance.

- Environmental Assessment: The Bureau of Reclamation Western Colorado Area Office completed an environmental assessment for the Drop 4 Hydropower Development Project. A Categorical Exclusion Checklist (CEC) was completed by Reclamation.

2) Clean Water Act (CWA) Compliance: An evaluation was conducted by Reclamation and it was determined that there was “no impact” to wetland and riparian resources.

3) National Historic Preservation Act (NHPA) Compliance: A Class III cultural resources inventory of the Drop 4 project area was completed by Alpine Archeological Consultants Inc., in October of 2013. Reclamation completed consultations with the Colorado State Historical Preservation Office under Section 106 of the NHPA. All occurrences will be mitigated or avoided. Copies can be provided upon request.

#### **IV Required Permits or Approvals**

1) Lease of Power Privilege (LOPP): The UVWUA worked directly with Reclamation to obtain a LOPP & Funding Agreement from Reclamation (See Appendix A).

2) Agreements or Easements: a) With the exception of the interconnection line which crosses BLM land, the Drop 4 Hydro Project is situated entirely within Reclamation lands. The BLM and Reclamation have an MOA in place which allows the construction of the transmission line within BLM property and is permitted in the LOPP, and b) A Power Purchase Agreement (PPA) has been secured with Municipal Energy Agency of Nebraska (MEAN).

# Official Resolution

Steve Anderson moved the adoption of the following resolution:

## RESOLUTION

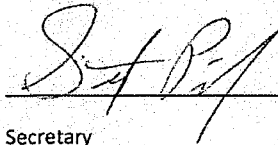
"Be it resolved, that for the purpose of its continued effort to pursue the development of hydro power in the Uncompahgre Valley, The Uncompahgre Valley Water Users Association does approve, ratify and confirm that:

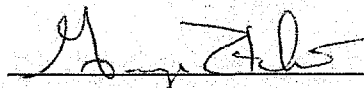
- 1.) Steve Fletcher, Manager, and Ed Suppes, Assistant Manager have the legal authority to enter into an agreement with the Bureau of Reclamation for financial assistance provided under the WaterSMART Grant Program;
- 2.) Mr. Fletcher and/or Mr. Suppes have reviewed and fully support the WaterSMART 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 Daris Jutten and approved by a vote of 6 to 0.  
Done this 15<sup>th</sup> day of December, 2014.

Attest:

  
Secretary

  
President

## V. Project Budget & Funding Plan

### Funding Plan

*Describe how the non-Reclamation share of the project costs will be obtained. Reclamation will use this information in making a determination of financial capability.*

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

Non-federal cost share for the project is a private venture and will be provided through bank loan, cash and in-kind contributions (See partnership description in #4 below).

Shavano Falls Hydro is contributing cost share to the project in the amount of \$8,166,141 via a secured loan and cash match. A loan in the amount of \$8,080,000 has been approved and cash match in the amount of \$2,020,000 is also available. The loan funds are being withdrawn monthly as needed for construction expenses. Other costs include travel, geospatial studies, archeological, environmental compliance, negotiation and development of the LOPP, legal fees, power purchase agreements, etc.

UVWUA is contributing cost share to the project via in-kind contributions related to the development, implementation, and management of the Drop 4 Hydro Project which include development of the feasibility study, LOPP, funding agreements, negotiation and drafting power purchase agreements, environmental compliance, legal support, and grant application development and compliance reporting. Funds are derived from water user assessments. In-kind contributions are estimated at \$85,131.

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

Project costs identified below will be included as true project costs (pre and post July 1, 2014) although UUVWUA will NOT seek reimbursement for any costs incurred prior to July 1, 2014.

3) What project expenses have been incurred? Include how the expenses benefitted the project, the amount and the date of incurrence.

#### UVWUA (Prior to July 1, 2014) – No reimbursement sought for these expenses

UVWUA has incurred expenses related to project management, legal and consulting fees for development of the feasibility study, LOPP, funding agreements, negotiating and drafting power purchase agreements, and environmental compliance. All activities are vital to the successful development and implementation of a project of this size.

•Legal & Consulting:	\$2,209.63 (10/31/13 – 06/30/14)
•Project Development:	\$1,121.00 (01/27/14 – 06/17/14)

GRAND TOTAL: \$ 3,330.63

**Shavano Falls Hydro LLC (Prior to July 1, 2014) – No reimbursement sought for these expenses**

Shavano Falls Hydro LLC has incurred costs related to the development of the hydroelectric project including piping, materials, interconnect, insurance, surveying and mapping, permitting, environmental resource studies, legal and miscellaneous expenses which are all critical and necessary to the development and implementation of the project.

•Pipe:	\$500.00 (12/24/13 – 05/05/14)
•Turbines & generator:	\$337,200.00 (12/27/13 – 05/16/14)
•Interconnect:	\$12,730.00 (10/11/13 – 12/06/13)
•Wells Fargo Insurance:	\$128,321.20 (03/25/14 – 05/03/14)
•Surveying:	\$5,879.95 (09/19/13 – 06/02/14)
•Aerial Mapping:	\$2,862.50 (10/15/13 – 10/16/13)
•Permitting, historical, plant surveys:	\$6,234.36 (11/14/13 – 12/05/13)
•Bank Fee:	\$18.45 (09/24/13)
•Legal & misc:	\$4,683.92 (10/30/13 – 06/02/14)
GRAND TOTAL:	\$498,430.38

**UVWUA (Post July 1, 2014)**

UVWUA has incurred expenses related to project management, legal and consulting fees for development of the feasibility study, LOPP, funding agreements, negotiating and drafting power purchase agreements, environmental compliance and WaterSMART grant proposal development. All activities are vital to the successful development and implementation of a project of this size.

•WaterSMART proposal development:	\$303.88 (12/05/14)
•Legal & consulting:	\$595.00 (10/24/14)
•Project development:	\$1,535.00 (07/01/14 – 01/02/15)
GRAND TOTAL:	\$2,433.88

**Shavano Falls Hydro LLC (Post July 1, 2014)**

Shavano Falls Hydro LLC has incurred costs after 07/01/14 related to the development of the hydroelectric project including piping, materials, interconnect, insurance, surveying and mapping, permitting, environmental resource studies, legal and miscellaneous expenses which are all critical and necessary to the development and implementation of the project.



•Mountain States – Civil:	\$1,168,340.54 (07/15/14 – 01/15/15)
•Pipe:	\$674,623.00 (09/09/14 – 01/02/15)
•Misc (dumpster, job trailer, toilets, etc):	\$1,577.54 (08/02/14 – 01/02/15)
•Turbines & generator:	\$337,200.00 (09/09/14 – 01/15/15)
•Mechanical Riverside:	\$330,266.00 (08/07/14 – 01/15/15)
•Switchgear:	\$153,577.50 (07/18/14 – 01/14/15)
•Interconnect:	\$30,886.48 (11/11/14 – 01/14/15)
•Transformers:	\$12,590.00 (01/14/15)
•Transmission Line Construction:	\$219,615.66 (10/14/14 – 01/14/15)
•Surveying:	\$8,602.10 (08/26/14 – 01/14/15)
•Permitting, historical, plant, etc.:	\$6,461.71 (09/09/14 – 09/25/14)
•Engineering:	\$610,000.00 (07/15/14 – 01/15/15)
•Bank Fee (Wire Fee):	\$20.00 (01/09/15)
•Legal & misc:	\$8,033.81 (09/12/14 – 01/14/15)
<b>GRAND TOTAL:</b>	<b>\$3,601,750.34</b>

4) Provide the identity and amount of funding to be provided by funding partners.

A partnership has been formed between UVWUA and Shavano Falls Hydro LLC to design, construct and operate the Drop 4 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. The owners have over 50 years of combined experience developing, funding, designing, owning and operating small hydro sites. Shavano Falls Hydro LLC will not be a signatory to any Reclamation contracts.

Shavano Falls Hydro LLC has a private bank loan and cash that allows them to provide up to \$10.1MM which is above the current total project cost estimate of \$9,151,272 (See letter of commitment).

5) Describe any funding requested or received from other Federal partners.

Not applicable.

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

Not applicable. Project funding has been secured.

**Table 1. – Summary of non-Federal and Federal Funding Sources**

<b>Funding Sources</b>	<b>Funding Amount</b>
Non-federal entities	
Shavano Falls Hydro LLC (Bank Loan)	\$8,166,141
UVWUA	\$85,131*
Non-federal subtotal:	\$8,251,272
Other Federal entities:	\$0
Not applicable	\$0
Other Federal subtotal:	\$0
Requested Reclamation funding:	\$900,000
<b>Total Project Funding:</b>	<b>\$9,151,272</b>

**Table 2. – Funding Group II Request**

<b>Funding Group II Request</b>			
	<b>Year 1 (FY 2015)</b>	<b>Year 2 (FY 2016)</b>	<b>Year 3 (FY 2017)</b>
Funding requested	\$500,000	\$400,000	\$0

**VI. Commitment Letters**

See commitment letters below.

## UVWUA Letter of Commitment – South Canal Drop 4 Hydropower Development Project

January 20, 2015

To whom it may concern:

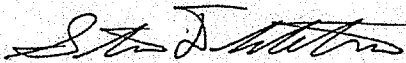
Uncompahgre Valley Water Users Association (UVWUA) is committed to clean, renewable energy development in the federal Uncompahgre Project Area (UPA) of western Colorado.

The UVWUA plans to utilize WaterSMART funds to assist in the construction of a 4.8 MW hydroelectric facility at an existing irrigation drop structure on the South Canal known as Drop 4. Drop 4 is located approximately 5.2 miles east of Montrose, Colorado.

The proposed project has multiple benefits including providing a local source of clean renewable energy while also allowing Reclamation and the UVWUA to address water conservation, water-quality (selenium and salinity) and endangered species compliance concerns within the basin through automation and piping improvements associated with the hydroelectric project.

The UVWUA will contribute cost-share to the project via in-kind services in the amount of \$85,131. Funds are currently available with no time constraints and no contingencies.

Sincerely,



Steve Fletcher  
Manager  
Uncompahgre Valley Water Users Association

## Shavano Falls Hydro LLC Letter of Commitment – South Canal Drop 4 Hydro

### **Shavano Falls Hydro LLC**

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5203 South 11th East, Idaho Falls, Idaho, 83404  
Phone: 208-716-3077 Fax: 208-522-8223

January 19, 2015

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 4.8 MW Drop 4 Hydroelectric Facility located on the South Canal in Montrose, Colorado. The owners of the 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 selenium concentrations in endangered species critical habitat, reducing salinity concentrations in the Gunnison and Colorado Rivers, and eliminating delivery system water losses.

Shavano Falls Hydro contributed cost share to the project via a secured loan in the amount of \$8,080,000 (80% of capital construction costs) and cash match in the amount of \$2,020,000. The loan was approved and funds are withdrawn monthly.

Sincerely,



---

Ted S. Sorenson P.E.  
Partner

## VII. Budget Proposal

**Table 3. – Funding Sources (South Canal Drop 4 Hydroelectric Development Project)**

Funding Sources	Percent of Total Project Cost	Total Cost by Source
Recipient Funding	90%	\$8,251,272
Reclamation Funding	10%	\$ 900,000
Other Federal Funding	0%	\$0
<b>TOTALS:</b>	<b>100%</b>	<b>\$9,151,272</b>

**Table 4. – Budget Proposal**

Budget Item Description	Computation		Quantity Type (e.g. hours/day)	Total Cost
	\$/Unit	Quantity		
<b>Salaries and Wages</b>				
Steve Fletcher, UVWUA Manager	38.5	818	Hours	\$31,493
Ed Suppes, UVWUA Assist. Manager	35.1	854	Hours	\$29,975
<b>Fringe Benefit</b>				
Steve Fletcher, UVWUA Manager	7.09	818	Hours	\$5,800
Ed Suppes, UVWUA Assist. Manager	6.81	854	Hours	\$5,818
<b>Travel</b>				
Shavano Falls Hydro LLC	\$3,000	20	Trips	\$60,000
<b>Equipment</b>				
Pipe	873,568	1	Lump Sum	\$873,568
Metal Building	39,750	1	Lump Sum	\$39,750
Turbine & Generator	1,686,000	1	Lump Sum	\$1,686,000
Switchgear	285,000	1	Each	\$285,000
Electrical Wiring	100,000	1	Lump Sum	\$100,000
HVAC	12,000	1	Lump Sum	\$12,000
Transformers	100,700	1	Each	\$100,700
Transmission Line	190000	1	Each	\$190,000
<b>Supplies/Materials</b>				
Misc Metal Supplies	26,300	1	Lump Sum	\$26,300
Misc - weld inspection, dumpster, temp power, bathrooms, etc.	75,330	1	Lump Sum	\$75,330
<b>Contractual/Construction</b>				
Mechanical: Riverside Inc.	707,900	1	Lump Sum	707,900
Civil: Mountain States	3,533,737	1	Lump Sum	3,533,737

Design & Engineering: Sorenson	630,000	1	Lump Sum	630,000
Interconnect to DMEA: Caribou	80,000	1	Lump Sum	80,000
Surveying	25,795	1	Lump Sum	25,795
Aerial Mapping	2,863	1	Lump Sum	2,863
Permitting, historical, and plant-animal surveys	17,856	1	Lump Sum	17,856
Reclamation: Planning & Design Tech Assistance, LOPP, NEPA Review	40,000	1	Lump Sum	40,000
UVWUA Legal & Consulting	2,900	1	Estimated	2,900
WaterSMART Reporting	46	81	Hours	3,686
WaterSMART Grant Proposal Dev.	46	120	Hours	5,460
Shavano Hydro Legal and miscellaneous	75,000	1	Lump Sum	75,000
<b>Other</b>				
Bank Fee	63,000	1	Lump Sum	63,000
Insurance	128,322	1	Lump Sum	128,322
Bank attorney, due diligence, engineer	75,000	1	Lump Sum	75,000
Freight & Customs duties	118,020	1	Lump Sum	118,020
Interest during construction	120,000	1	Lump Sum	120,000
<b>Total Direct Costs</b>				
Indirect Costs - 0 %	0	0		0
<b>Total Project Costs</b>				<b>9,151,272</b>

## A. Budget Narrative

### 1. Salaries and Wages

Key personnel associated with the Hydropower Project include:

**UVWUA:** Steve Fletcher, Manager (818 hrs. @ base rate \$38.50, fringe \$7.09)

Ed Suppes, Assistant Manager (854 hrs. @ base rate \$35.10, fringe \$6.81)

#### **Shavano Falls Hydro LLC (Engineering) (non-grant recipient):**

Ted Sorenson, P.E. (Base rate \$29.49, fringe \$9.83)

Mike Jardine, P.E. (Base rate \$24.52, fringe \$8.17)

Teddy Sorenson, E.I.T. (Base rate \$22.38, fringe \$3.77)

(see supporting documentation)

\*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 for Shavano Falls Hydro LLC.

**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 Shavano will likely have a company truck brought to Montrose. A rental care may only be used in rare instances. Length of stays may vary depending upon phase of the project, but are likely to average 16 nights/month. Shavano agrees to comply with all associated GSA travel requirements/rules. Estimates for travel costs are based upon the average cost of flights from Idaho Falls, Idaho to Montrose or Grand Junction, CO.

Meal per diem: \$ 56/day

Hotel: \$90/night

Rental Car: \$72-106/day (standard car or truck, respectively)

Airfare: \$460 per RT ticket from Idaho Falls to Montrose or Grand Junction, CO

## 4. Equipment

All equipment being purchased for this project is directly related to the construction of the actual hydropower plant. Equipment purchases have been identified in the Table 4 – Budget Proposal.

## 5. Materials and supplies

The costs for all major materials and supplies purchased for this project were provided as lump sum estimates and are directly related to the construction of the hydropower project.

## 6. Contractual

The Project Timeline, Tasks, and Milestones (Table 3) on page 44 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 Budget table. Budget costs were determined to be fair and reasonable based upon UVWUA's experience carrying out multiple hydropower construction projects at Drop Structures 1 and 3 on the South Canal and Drop 6 at Shavano Falls. In addition, UVWUA's partner for the project, Shavano Falls Hydro LLC, has significant experience owning, building, operating and maintaining hydroelectric facilities. Because Shavano Falls Hydro is

financing the project, they are best served by keeping costs as low and as reasonable as possible.

#### 7. Environmental and Regulatory Compliance Costs

A total of \$67,856 has been budgeted for environmental compliance activities associated with the project which is 1% of the project costs. They are:

- Permitting, historical and plant-animal surveys: \$17,856
- Reclamation Permitting, NEPA Review, etc.: \$40,000

\*This amount is less than 1% of the total project costs because the project is already underway and all environmental and regulatory compliance costs have been incurred. In other words, the UVWUA is able to provide actual and true costs at this time rather than an estimate because work is complete.

#### 8. Reporting

The UVWUA understands that semi-annual and a final reporting will be required in the event grant funding is awarded. Funds have been budgeted to contract with a professional grant consultant to conduct 3 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 South Canal Drop 4 Hydroelectric Development Project.

#### 11. Total Costs

Total project cost for construction and implementation of the South Canal Drop 4 Hydroelectric Development Project is \$9,151,272.



**Appendix A: Lease of Power Privilege (LOPP) (Complete document available upon request)**



**United States Department of the Interior**

BUREAU OF RECLAMATION  
Upper Colorado Regional Office  
125 South State Street, Room 8100  
Salt Lake City, UT 84138-1102

IN REPLY REFER TO:

UC-600  
PRJ-17.00

SEP 08 2014

Mr. Steve Fletcher  
Manager  
Uncompahgre Valley Water Users Association  
601 North Park Avenue  
P.O. Box 69  
Montrose, CO 81402-0069

Subject: Contract No. 14-07-40-P-350 Lease of Power Privilege Among the United States of America, and Uncompahgre Valley Water Users Association for the Development of Hydroelectric Power on South Canal Drop 4

Dear Mr. Fletcher:

Enclosed is a fully executed and signed copy of the subject contract. If you have any questions, please contact Mr. Rick Clayton at 801-524-3710.

Sincerely,

Brent Rhees  
Acting Regional Director

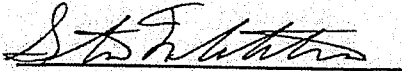
Enclosure

## Appendix B – Statement of Agreement with Requirements for Agricultural Operations

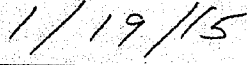
### Statement of Agreement with Requirements for Agricultural Operations

In accordance with Section 9504 (a)(3)(B) of Public Law 111-11, the Uncompahgre 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 County, 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 operations of the eligible applicant, as determined pursuant to the Colorado water law.



Steve Fletcher, Manager



Date

# Appendix C – South Canal Drop 4 Hydroelectric Features

