# TITLE PAGE

## WATERSMART: WATER AND ENERGY EFFICIENCY GRANT FOR FY 2016
## FOA NO. R16-FOA-DO-004

## FUNDING GROUP I

## GRAND VALLEY PROJECT - GOVERNMENT HIGHLINE CANAL TOP 500 FEET LINING PROJECT-CANYON CANAL IMPROVEMENT PROJECT
## MESA COUNTY, COLORADO


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# 1.0 Technical Proposal and Evaluation Criteria

## 1.1 Executive Summary

**Date:** January 20, 2016
**Applicant name:** Grand Valley Water Users Association (GVWUA)
**City:** Grand Junction
**County:** Mesa
**State:** Colorado
**Estimated Project Start:** November 1, 2017
**Project Length:** 6-8 weeks
**Estimated Project Completion:** March 15, 2018 (no later than)
**Federal facility:** Yes, Bureau of Reclamation (Grand Valley Project)

**Project Summary:**

The Grand Valley Water Users Association (GVWUA) is the managing entity for the federally owned Grand Valley Project. The Grand Valley Project facilities include the Grand Valley Diversion Dam, known as the Roller Dam, on the Colorado River in DeBeque Canyon; an attendant headgate diversion structure; five miles of Canyon Canal and related facilities, including endangered fish recovery facilities; the Stub Ditch pump station; the 55-mile-long Government Highline Canal; 150 miles of project laterals; 100 miles of drainage ditches; and the Grand Valley Hydroelectric Power Plant (GVPP) which is operated under a Lease of Power Privilege (LOPP) with Bureau of Reclamation (Reclamation) (Figure 1 and Figure 2). These facilities 1) provide irrigation water for Orchard Mesa Irrigation District (OMID), Palisade Irrigation District (PID), Mesa County Irrigation District (MCID); 2) deliver water through GVWUA's Government Highline Canal which provides irrigation water to approximately 23,500 acres in the Gravity Division of the Grand Valley Project; 3) deliver water year round water to the 3.5 megawatt (MW) GVPP; and 4) maintain critical stream flows in the 15 Mile Reach of the Colorado River, which is critical habitat for four species of endangered fish.

GVWUA and OMID are proposing to improve the hydraulic efficiency of the top 500 feet of the Canyon Canal by installing a PVC liner and a shotcrete wear surface. These entities are requesting a **$296,000** WaterSMART cost share grant under **Funding Group I** to complete this $800,000 project. These improvements are expected to result in the accommodation of at least 100 cubic feet per second (cfs) more of the legal water rights adjudicated for this structure and increase the diversion ability and efficiency during times of river flow below 2,250 cfs.

Significant project planning has been completed including design work and National Environmental Policy Act (NEPA) related compliance issues.

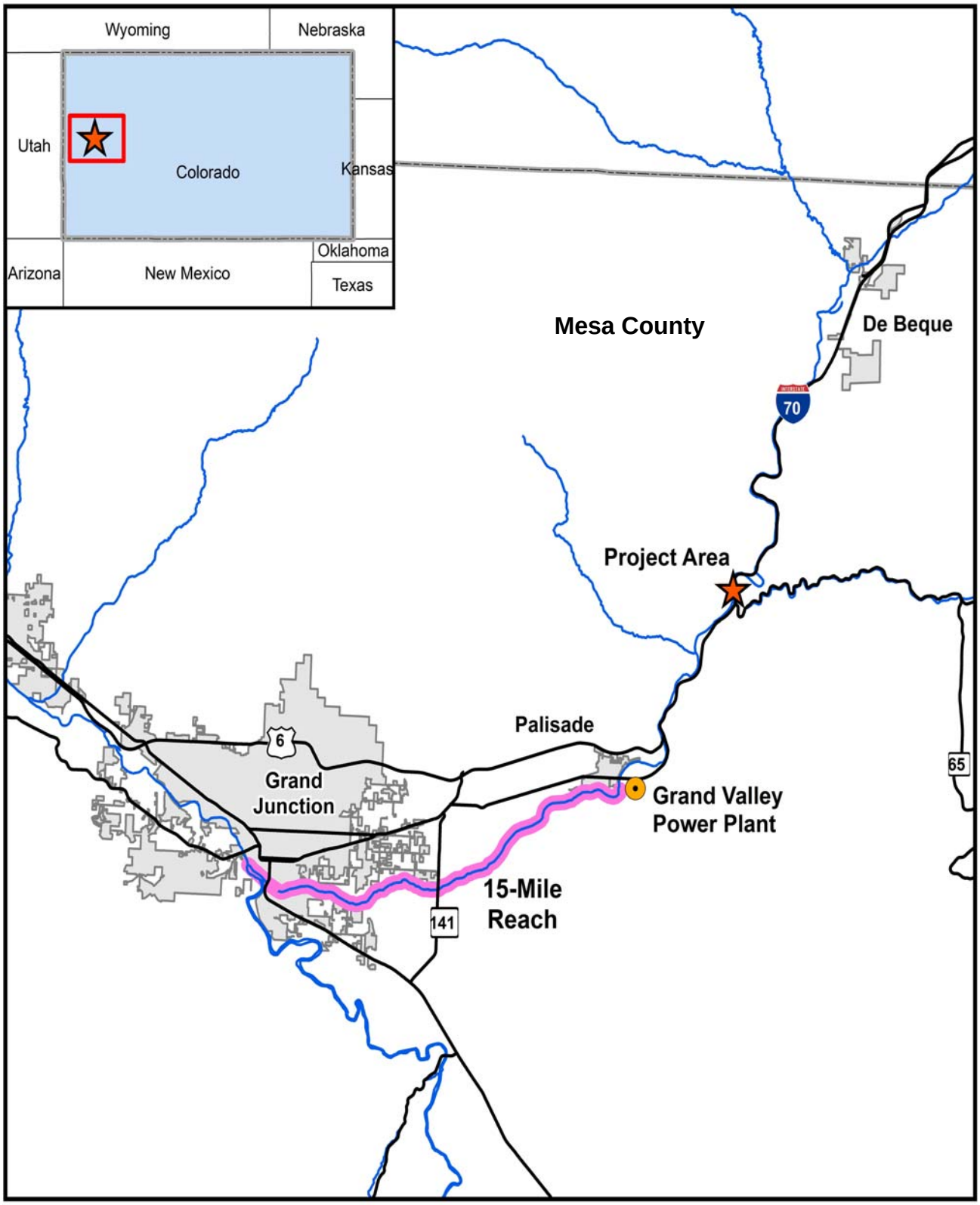


**Figure 1. Project Geographic Location.**

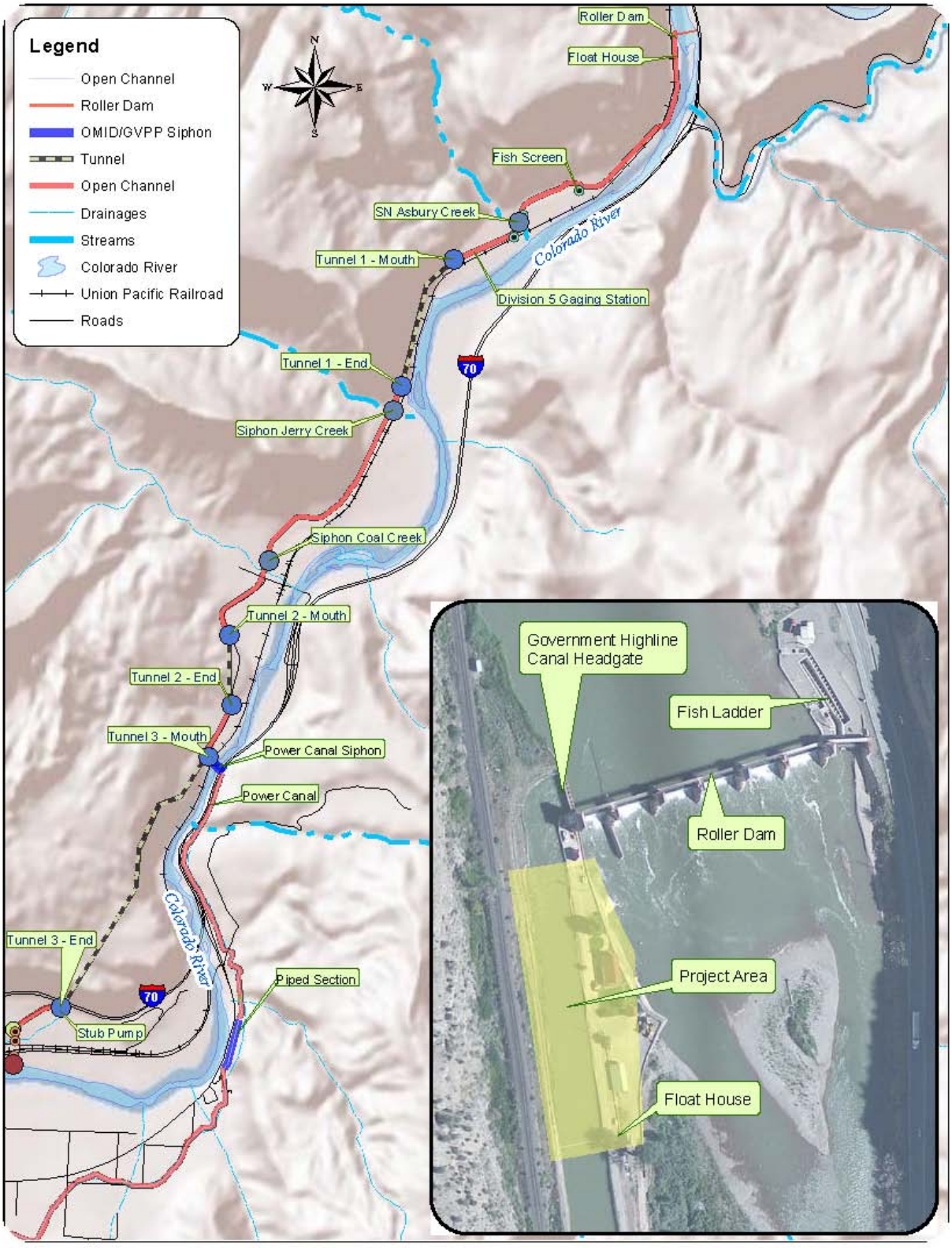


**Figure 2. Project Area Map.**

Such improvements address several evaluation criteria including:

- B-Energy-Water Nexus;
- C-Benefit Endangered Species;
- D-Water Marketing;
- E-Water Supply Sustainability;
  - E2-Water Banking
  - E3-Water Supply Sustainability
- F- Implementation and Results
- G – Additional Non-Federal Funding
- H – Connection to Reclamation Project Activities

The overarching benefits realized through this project include, but are not limited to:

- Complying with obligations to those that receive water from the Roller Dam: Orchard Mesa Irrigation District, Palisade Irrigation District, Mesa County Irrigation District, and the Grand Valley Power Plant and with the obligations of the Orchard Mesa Check case which also benefits Grand Valley Irrigation Company.
- Allowing GVWUA to better maintain adequate flows in the 15 Mile Reach to aid in the Colorado River Endangered Fish Recovery Program.
- Providing consistent and uniform delivery of water throughout the 50 mile Grand Valley delivery system.
- Complying with contractual obligations of GVWUA to Reclamation for adequate maintenance and operation.
- Reducing Compact issues by supporting a sustainable balance between Lake Powell and Lake Mead.
- Helping implement provisions of the Colorado River Cooperative Agreement and benefits all of the signers of that Agreement.
- Staying above the power generation level in Powell benefits not just irrigation users, but nearly all power users in the West.
- Supporting Colorado River recreation opportunities by moving irrigation water down the Grand Valley and beyond.
- Improving wildlife habitat through the ability to conserve water at the Roller Dam and in the Colorado River.
- Supporting economic and civic development throughout the Grand Valley through effective and efficient irrigation water systems.

## 1.2 Background Data and Project Understanding

This section addresses the information requested in Section IV.D.4, Background Data, of the Funding Opportunity Announcement R16-FOA-DO-004 (FOA). A summary of the identified information is provided at the end of this subsection.

### 1.2.1 Project Eligibility and Funding Understanding

GVWUA understands that eligible projects should seek to conserve and use water more efficiently, increase the use of renewable energy and improve energy efficiency, protect endangered and threatened species, facilitate water markets, or carry out other activities to address climate-related impacts on water or prevent any water-related crisis or conflict. This application has been prepared with the intent to align with these overarching WaterSMART funding objectives with the goals of this project to the extent possible.

### 1.2.2 Project Background

The purpose of this project is to improve the hydraulic efficiency of the top 500 feet of the Canyon Canal by installing a PVC liner and a shotcrete wear surface. In addition to the direct economic benefits in supporting the agricultural economy of the Grand Valley, this project will promote the full exercise of the "Cameo Call" water rights, support the continued operation of the Roller Dam and canyon facilities, provide reliability to Colorado River flows in the Upper and Lower Colorado River Basins, provide for more efficient operation of the GVPP and the production of more renewable energy from that facility, provide benefits for endangered fish, and provide associated environmental and cultural benefits.

#### 1.2.2.1 Water Delivery System

The Roller Dam diverts water into the Government Highline Canal for irrigation and hydropower purposes under very senior water rights that collectively make up the "Cameo Call" from the Colorado River. The irrigation water is provided to four irrigation entities: GVWUA and the Orchard Mesa, Palisade and Mesa County Irrigation Districts (Irrigation Districts), which provide irrigation water to approximately 39,000 acres of land in the Grand Valley. The hydropower water is used to produce hydropower at the GVPP, which has a capacity of approximately 800 cfs and a current electrical generation capacity of about 3.5 MW.

GVWUA is the managing entity for the federally owned Grand Valley Project. The Grand Valley Project facilities include the Grand Valley Diversion Dam, known as the Roller Dam, on the Colorado River in DeBeque Canyon; an attendant headgate diversion structure; five miles of Canyon Canal and related facilities, including endangered fish recovery facilities; the Stub Ditch pump station; the 55-mile-long Government Highline Canal; 150 miles of project laterals; 100 miles of drainage ditches; and the GVPP which is operated under a LOPP with Reclamation (Figure 1 and Figure 2). These facilities 1) provide irrigation water for the Irrigation Districts; 2) deliver water through GVWUA's Government Highline Canal which provides irrigation water to approximately 23,500 acres in the Gravity Division of the Grand Valley Project; 3) deliver water year round water to the 3.5 MW GVPP; and 4) maintain critical stream flows in the 15 Mile Reach of the Colorado River, which is critical habitat for four species of endangered fish. In recent years, approximately 130 miles of the laterals have been re-constructed into pressure piped laterals.

GVWUA first delivered water in 1915 to lands under Reclamation's Grand Valley Project and since then has furnished a full supply of irrigation water to approximately 23,500 irrigated acres under the Government Highline Canal and 15,000 irrigated acres under the Mesa County, Palisade, and Orchard Mesa Districts and diverts the water for the Grand Valley Power Plant year round.

#### 1.2.2.2 Irrigated Acreage

In general the crops irrigated with this water include corn, dry beans, alfalfa, grass hay, pasture, small grains, and seed crops. Fruits and vegetables raised on Grand Valley Project lands include apples, pears, peaches, and grapes and a variety of truck crops. GVWUA delivers irrigation water to approximately 23,500 irrigated acres within their service area. The total number of irrigated acres within the service area varies from year to year and some discrepancies exist between data sources. Table 1. Irrigated Cropland, NASS 2014. illustrates the total number of acres within GVWUA service area by crop type according to 2014 data from the National Agricultural Statistics Service (NASS) Cropscape cropland data layer for the crop year 2014 (Olsson and Associates Operational Study, 2015; report available upon request).

**Table 1. Irrigated Cropland, NASS 2014.**

| Crop Type | Acres |
|---|---|
| Alfalfa | 14,379 |
| Corn | 2,973 |
| Winter Wheat | 2,143 |
| Other Hay/Non-Alfalfa | 1,267 |
| Other Crops | 1,621 |
| Developed/Open Space | 1,233 |
| **Total** | **23,616** |

GVWA and OMID share in the cost of operation and maintenance of the Canyon Canal per a 1955 agreement, at 71.6% and 28.4%, respectively. Daily operation of the Roller Dam and canyon facilities are performed by GVWUA. OMID conducts the daily operations of its facilities and of the GVPP, with each organization paying one-half of the associated operation and maintenance cost of the GVPP.

Return flows from the GVPP return to the Colorado River at the head of the 15 Mile Reach, which helps maintain flows in that reach for the Colorado pikeminnow, Humpback chub, Bonytail, and the Razorback sucker, all listed as endangered fish (Table 2).

There are no direct municipal uses associated with the water in the canal; however irrigation water is delivered to urban/suburban customers via the Irrigation Districts.

**Table 2. Endangered Fish in the 15 Mile Reach.**

| Species | Listing |
|---|---|
| Colorado pikeminnow *Ptychocelius lucius* | Endangered |
| Humpback chub *Gila cypha* | Endangered |
| Bonytail *Gila elegans* | Endangered |
| Razorback sucker *Xyrauchen texanus* | Endangered |

#### 1.2.2.3 Water Rights

The water rights of the Grand Valley irrigation systems that comprise the "Cameo Call" are diverted from the Colorado River and, along with the water rights of the Shoshone Hydropower Plant upstream near Glenwood Springs, control administration of the Colorado River basin within Colorado. The flows generated by the "Cameo Call" help provide water for recreational activities on the Colorado River and for riparian habitat and aesthetic values along the entire Colorado River corridor. Flows generated by the Cameo Call also assist the state in complying with its obligations under the Colorado River Compact and in maintaining acceptable lake levels in Lake Powell. Water rights comprising the Cameo Call are for irrigation; power and domestic use as described in Table **3**. Irrigation water is tied to specific lands within the Grand Valley Project and provides full and supplemental service. The domestic water right is a small water right primarily used for livestock watering purposes during non-irrigation season and has not been needed to be used for several years.

GVWUA was a co-Applicant in Case No. 91CW247 ("Check Case"), District Court, Water Division. The other co-applicants were OMID and the United States. Details of the Check Case are available upon request.

All water users within the Grand Valley Project will benefit from better management of the Grand Valley Project, including the lining of the top 500 feet of the Canyon Canal. The Irrigation Districts will see additional benefits with this project as it aims to maintain the critical delivery of water to their users. The Grand Valley Irrigation Providers directly impacted by this project include (Figure 3):

- Grand Valley Water Users Association
- Mesa County Irrigation District
- Orchard Mesa Irrigation District
- Palisade Irrigation District

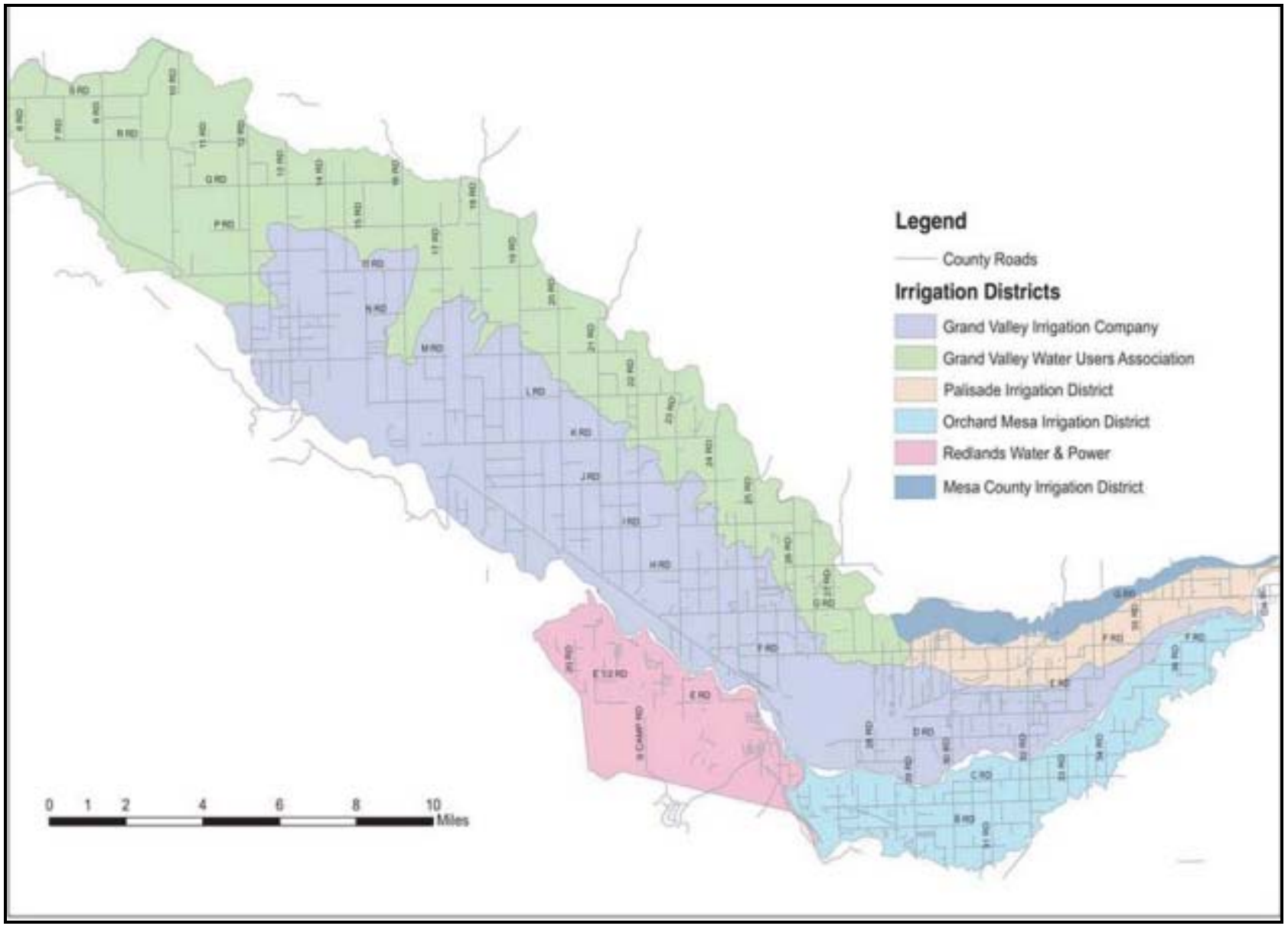


**Figure 3. Grand Valley Irrigation Providers.**

**Table 3. Summary of Cameo Water Rights.**

| Owner | Amount (cfs) | Adjudication Date | Appropriation Date | Use |
|---|---|---|---|---|
| GVWUA/United States | 730 | 7/22/1912 | 2/27/1908 | Irrigation |
| GVWUA/United States | 400/800 | 7/25/1941 | 2/27/1908 | Hydro-electric Power |
| GVWUA/United States | 220 | 7/25/1941 | 2/27/1908 | Domestic & Livestock |
| Orchard Mesa Irrigation District | 450 | 7/22/1912 | 10/25/1907 | Irrigation |
| Orchard Mesa Irrigation District | 10.2 | 7/22/1912 | 10/1/1900 | Irrigation |
| Palisade Irrigation District | 23.5 | 7/25/1941 | 6/1/1918 | Irrigation |
| Palisade Irrigation District | 80 | 7/22/1912 | 10/01/1889 | Irrigation |
| Mesa County Irrigation District | 40 | 7/22/1912 | 7/6/1903 | Irrigation |

#### 1.2.2.4 Water Shortfalls

The amount of water diverted by the Roller Dam is dependent upon snowpack and annual precipitation; however the water rights associated with the Grand Valley Project are very senior. Anticipated shortfalls for the Grand Valley Project could come with: 1) Drought; the Colorado River water supply could decline during periods of drought; and 2) Water seepage; the portion of the Canyon Canal considered for this project is currently unlined. Seepage is occurring at an undetermined rate through this section resulting in lower deliveries of water to downstream water users.

### 1.2.3 Renewable Energy or Energy Efficiency

One of the primary goals of this project is to increase the amount of water diverted at the Roller Dam. Some of this additional water will be run through the GVPP, which produces renewable energy in the form of hydropower as described in Section 1.4.1. Accordingly, this project will assist in generating additional amounts of renewable energy.

### 1.2.4 Relationship with Reclamation

GVWUA and OMID have been working with Reclamation staff for many years as part of the continued operation of the Grand Valley Project and its facilities. Reclamation has designed and constructed several significant salinity control projects on the Government Highline Canal and it supports this project.

Following is a summary of other recent Reclamation projects. More detail is also provided in Section 1.4.7, Evaluation Criterion H, Connection to Reclamation Project Activities.

#### 1.2.4.1 Top 500 Feet Canal Lining Project (Current Application)

**Project Summary**
Reclamation staff has provided the design work and attendant pricing estimates for this project, offering engineering design alternatives for reshaping the canal prism and replacing the concrete liner currently in place. They will continue to provide technical and professional assistance, ultimately delivering construction drawings and specifications. GVWUA and OMID will be seeking matching funds from Reclamation, the CWCB, and possibly other sources, in addition to the cash and in-kind contributions they will make to the project.

**Dates**
The project is anticipated to begin on or about November 1, 2017 and be completed no later than March 15, 2018.

#### 1.2.4.2 Water Management Plan (WMP)

**Project Summary**
Recently, GVWUA received grants from both the Colorado Water Conservation Board (CWCB) Water Supply Reserve Account (WSRA) and Reclamation (Field Services Grant) to match the in-kind and cash contributions of GVWUA to completely update its Water Management Plan (WMP). The objective of the WMP project is to prepare a conditional assessment and operational analysis of the 50 miles of the canal below the outfall of Tunnel No. 3, identify and document water losses, identify priority projects, conduct a benefits analysis, ascertain environmental concerns, determine costs associated with the projects and create a strategic funding plan to implement the priority projects. The WMP project will also allow GVWUA to implement certain provisions of the Colorado River Cooperative Agreement (CRCA, Section 7, specific to conservation and avoidance of Colorado Compact issues).

**Dates**
The WMP project began in fall 2015 and is anticipated to conclude in early 2017.

#### 1.2.4.3 Reclamation Salinity Program – Government Highline Canal – Reach 1A Lower Section Lining Project

**Project Summary**
The overall purpose of the Reach 1A Lower Section Lining project is to install approximately 4,774 feet of PVC liner to an unlined and open section of the Government Highline Canal. The section of canal to be lined is earthen that was originally designed with a trapezoidal cross section with a 30-foot bottom and 2:1 side slopes. Over the years the slopes have eroded and sloughed. In some sections

heavy vegetation has grown in along the sides down to the high water surface line in the canal. The proposed improvements include lining with 2 layers of geotextile fabric on either side of a 30 mil PVC liner covered with a protective 3 inch shotcrete layer. A gravel underdrain will also be installed. The total project award is $3.6 million.

**Dates**
This project began in October 2015 and is anticipated to conclude in March 2018.

#### 1.2.4.4 Government Highline Canal Lining and Improvements Projects

**Projects Summary**
The Government Highline Canal – Stage 1 project was constructed in the early 1980's. This project included reshaping about 6.7 miles of canal and lining with unreinforced concrete. This section of canal had 1-1/2:1 side slopes with an 8 foot bottom width. Other features of this project included items such as an 8 foot diameter pipe siphon with radial gate check inlet, wildlife ponds, detention ditches, check structures with radial gates, wasteways, removal of original turnout structures and installation of constant head orifice turnouts, and relocating county roads.

The East End Government Highline Canal – Stage 2 was constructed in the early 1990's. This project included constructing approximately 7.4 miles of buried PVC membrane-lined canal having a bottom width of 30 feet and 2-1/2:1 side slopes with limited reaches of concrete or shotcrete lined sections. Other features of this project included check structures, lateral turnouts, culverts, cross drains, irrigation crossings, drain inlets, a canal underdrain system, and canal safety devices.

The Reach 1A Salinity Lining Replacement project was undertaken by GVWUA and includes approximately $160,000 of replacement work on Stage 1A of the Government Highline Canal. GVWUA performed approximately $40,000 of the work in FY 2015 and the remainder will be done in approximately equal parts in FYs 2016 and 2017.

In addition approximately 130 miles of laterals branching from the Government Highline Canal have been piped by the Salinity Control Project.

Since completion, these projects have been operated and maintained by GVWUA.

#### 1.2.4.5 Other Grand Valley Project Improvements

The recent $850,000 rehabilitation of the Roller Dam roller gates were funded entirely by GVWUA and OMID; the $250,000 Stub Pump refurbishment was funded by GVWUA; the forthcoming $5.3 million GVPP Rehabilitation Project is being jointly pursued jointly by GVWUA and OMID; Reclamation and Recovery have invested $17 million in OMID canal system improvements; and millions of dollars have been invested in the continual improvements of the Grand Valley Project through a variety of arrangements by the Recovery Program, Reclamation, and the State of Colorado.

### 1.2.5 Project Background Summary

In summary, the Top 500 Feet Canyon Canal Improvement Project (Canyon Canal Improvement Project or Project) is a critical component of an overall system improvement initiative that includes several Reclamation owned facilities. The Colorado Basin Roundtable (CBRT) recently identified the protection of the Cameo Call as a Top Basinwide Project as identified in the Colorado Basin Implementation Plan (BIP) and Colorado Water Plan (CWP). The efficient and sustained operation and administration of the Cameo Call irrigation and power water rights and the appurtenant facilities are rightly seen as being of fundamental importance to the entire Colorado Basin. Construction of this project is anticipated to begin in November 2017. It is expected that the construction will be completed no later than mid-March 2018, at which time irrigation water must be returned to the Government Highline Canal, OMID, PID, and MCID distribution systems to accommodate irrigation needs.

- **Source of water:** Colorado River
- **Current water uses:** Irrigation, hydro-electric power, domestic, & livestock
- **Number of water users served:** ~40,000 (Mesa County Planning 2010 Census data;10,000 four member households)
- **Current water demand:** 1730 cfs (irrigation season); 800 cfs (non-irrigation season)
- **Projected water demand:** 1730 cfs (irrigation season); 800 cfs (non-irrigation season)
- **Shortfalls in existing water supply:** Drought; seepage
- **Major crops served:** corn, dry beans, alfalfa, grass hay, pasture, small grains, and seed crops. Fruits and vegetables apples, pears, peaches, and grapes and a variety of truck crops.
- **Total acres served:** ~39,000 acres (23,500 acres under the Canal and 15,000 acres under the MCID, PID, and OMID and water for the GVPP year-round)
- **Water delivery system description:** These Grand Valley Project facilities include the Grand Valley Diversion Dam, also known as the Roller Dam, on the Colorado River in DeBeque Canyon, the 55-mile-long Government Highline Canal (which includes the Canyon Canal), 150 miles of project operated laterals, 100 miles of drainage ditches and a hydroelectric power plant. The Roller Dam and upper portions of the Government Highline Canal, including this Canyon Canal Improvement Project, are part of the Dam and Canyon Facilities Master Plan under current active development. GVWUA first delivered water in 1915 to lands under Reclamation's Grand Valley Project and since then has supplied a full supply of irrigation water, diverted at the Roller Dam, to approximately 23,500 irrigated acres under the Government Highline Canal. In addition, diversions at the Roller Dam provide water to 15,000 irrigated acres under the Irrigation Districts and water for the Grand Valley Power Plant year-round. The primary co-participant for this

project is OMID. OMID has two - 15 mile long delivery canals supplied by four hydraulic pumps. OMID provides irrigation water to a little more than 9,000 acres and 10,000 water users.

## 1.3 Technical Project Description

This section addresses the information requested in Section IV.D.4, Technical Project Description, of the FOA. GVWUA, OMID, and Reclamation propose to line the upper 500 feet of the Government Highline Canal immediately below the Roller Dam (Figure 4 and Figure 5. General setting and existing condition of the top 500 feet of the Canyon Canal; looking down canal.) in an effort to improve the overall integrity of the canal and firm up the water rights associated with the Roller Dam. The embankment between the canal and Colorado River is degrading and sinkholes develop on occasion. Also, the left side of the canal (looking downstream) has sloughed and is thereby restricting flows. This section of canal has minimal freeboard and has overtopped in the past.

### 1.3.1 Project Need

The embankment immediately below the Roller Dam is relatively narrow and separates the Canyon Canal from the Colorado River. This section of canal was constructed between 1913 and 1915. Over the last 100 years of use the embankment has slumped, settled and degraded. Occasionally water has induced piping erosion within the embankment and led to material loss and sinkholes. This process further destabilized the area and most likely contributed to some of the slumping. Over the years, measures have been taken to control and prevent these processes from escalating. One such action which can still be observed is shotcrete lining along the side slope.

However, the movement of the bank continued and led to cracking and displacement of the shotcrete. These actions have resulted in a reduced canal cross section. In addition, the degraded shotcrete as well as displaced masonry stone and riprap has created a very rough surface which restricts water flow. The combination of the reduced cross section and roughened surface has created a “choke” in the flow in the canal.

Measurements of the canal cross section were taken at several locations along the top 500 foot section. Manning’s formula was used to calculate theoretical flow values for a full canal and it verified readings being taken by GVWUA’s flow gauge. The canal is being restricted to approximately 1,600 cfs while the water rights are for 1,730 cfs. An additional 100 cfs to 150 cfs is needed to operate the new fish screen located downstream in the canal. Again using Manning’s formula, it was determined if the canal were returned to its original cross section and lined with shotcrete; it would be capable of conveying all of the water entitled to be diverted under the Cameo Call water rights and the water needed to operate the fish screen.

**Figure 4. General setting and existing condition of the top 500 feet of the Canyon Canal; looking down canal.**


**Figure 5. General setting and existing condition of the top 500 feet of the Canyon Canal; looking down canal.**

Another way of describing this is by looking at normal depth. Normal depth is the depth of water flow when it is continuous, uniform and steady. Again, Manning's formula was utilized for computing the following information. The existing rough and reduced cross section has a normal depth of approximately 12 feet with 1,580 cfs water flow. If the cross section were returned to its original design and lined with shotcrete, the depth of flow for the 1,880 cfs (combination of the water rights and fish screen requirements) would result in a normal depth of just over 6 feet. However, it is important to consider other possible restrictions downstream which would induce a backwater effect. These other restrictions could produce a normal depth equal to the existing conditions even with the improved cross section, but by lining this area it would no longer be contributing to the reduction in flow.

Two conceptual designs were developed for the lining Project. Both designs would begin where the concrete transition structure of the Roller Dam ends. Both designs would end at the float-house structure approximately 500 feet downstream of the transition structure (Figure 6).

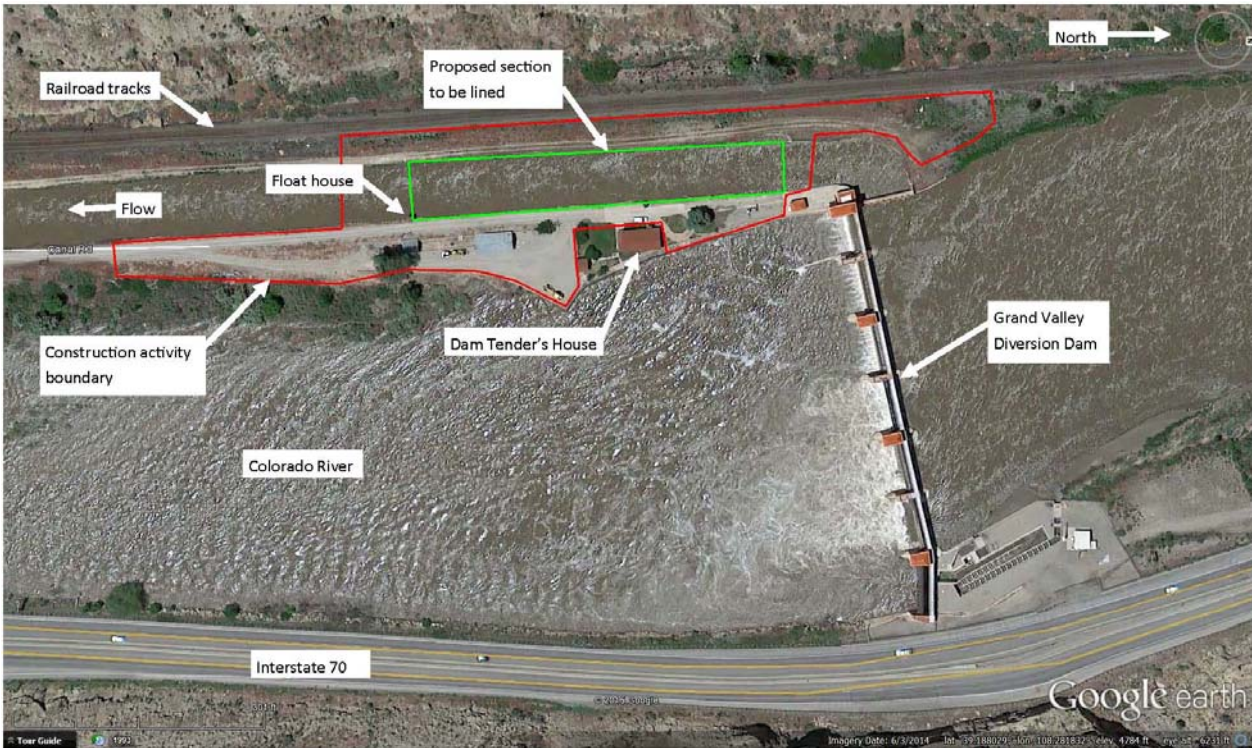


**Figure 6. Aerial View of the Roller Dam (Grand Valley Diversion Dam) and Top 500 Feet of the Canyon Canal to be Lined.**

### 1.3.2 Design Alternatives Considered

The first design alternative would involve returning the canal to its original shape with 1 ½:1 side slopes and a 38 foot bottom width. The unsuitable material would need to be excavated from the current prism for this to occur. Once suitable mineral soil is reached, free draining pit run material would be brought in and compacted to

achieve the desired cross-section. A toe drain would be installed to control groundwater pressure. A liner would be installed consisting of 30-mil PVC with 10 ounce geotextile fabric on either side. A 3 inch thick layer of shotcrete would be placed onto the top layer of geotextile. The shotcrete will provide a wearing surface as well as ultraviolet protection for the liner. This type of lining has been utilized in other Reclamation projects and has an anticipated lifespan of at least 50 years.

The second design alternative would involve constructing a vertical retaining wall on the left side of the canal instead of a sloped side. The transition structure from the canal head gates to the earth lined section of canal has vertical walls. The transition from vertical walls to 1 ½:1 side slopes occurs where the proposed lining would begin. Therefore, the vertical section in the transition structure would be extended for a majority of the first 500 feet. The bottom width and right side of the canal would be constructed as described in the first design. The advantage of having a vertical retaining wall on the left side would be to provide additional area at the top of the embankment between the canal and Colorado River for operation and maintenance activities (Figure 7 and Figure 8). Currently this area is challenging to maneuver in even with smaller vehicles. This design could provide up to 15 feet of additional width.

The shotcrete over liner with a 1 ½:1 side slope for the canal prism was the selected design. The same hydraulic improvements can be achieved, it is more cost effective, and 10 feet of additional embankment will be gained.

#### 1.3.2.1 Electric Service

The electric service for the Roller Dam is currently comprised of poles with overhead lines. This creates additional complications for operation and maintenance activities. Therefore, GVWUA proposes to bury the electric service within the canal embankment during this Project.

#### 1.3.2.2 Project Area of Influence

The area of influence (AOI) for construction activities should be the same for both designs and is depicted in Figure 9 by the red line. The construction area on the east side of the canal is bounded by the railroad tracks. Precise easement boundaries have yet to be investigated but the railroad tracks shall not be impacted. The west side is bounded by the Colorado River. These construction activities shall not influence the Colorado River. Essentially the area to be used for construction is regularly used for operation and maintenance activities. There is also a cleared area approximately 2,650 feet south of the Roller Dam which GVWUA uses for turning around vehicles. This area is approximately ½ acre in size and could be used for staging purposes.


**Figure 7. Aerial View of the Canal Section with Varying Widths (Excerpt from Reclamation Drawing, 2015).**

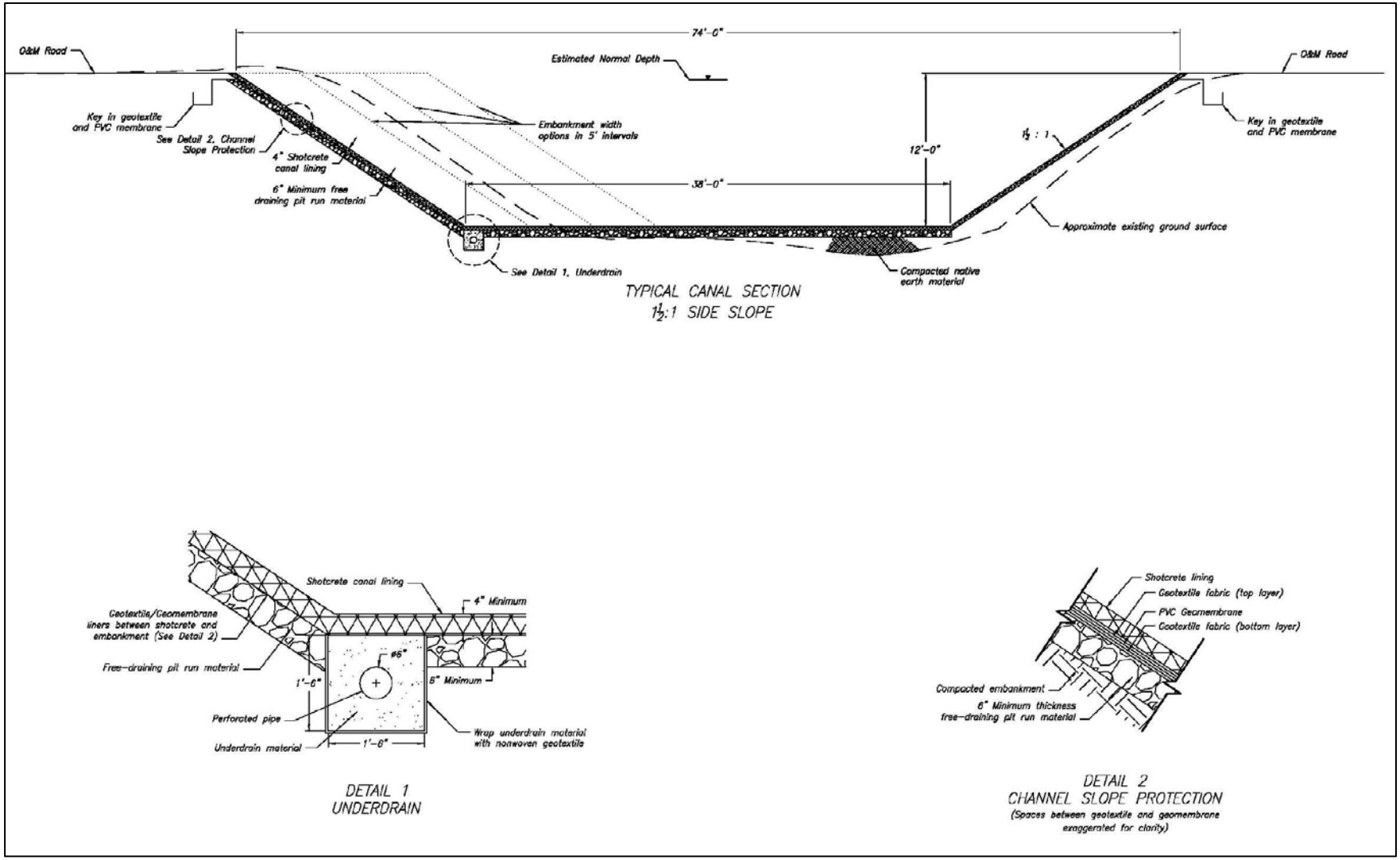


**Figure 8. Typical Section for Proposed Canal Alternatives (Excerpt from Reclamation Drawing, 2015).**

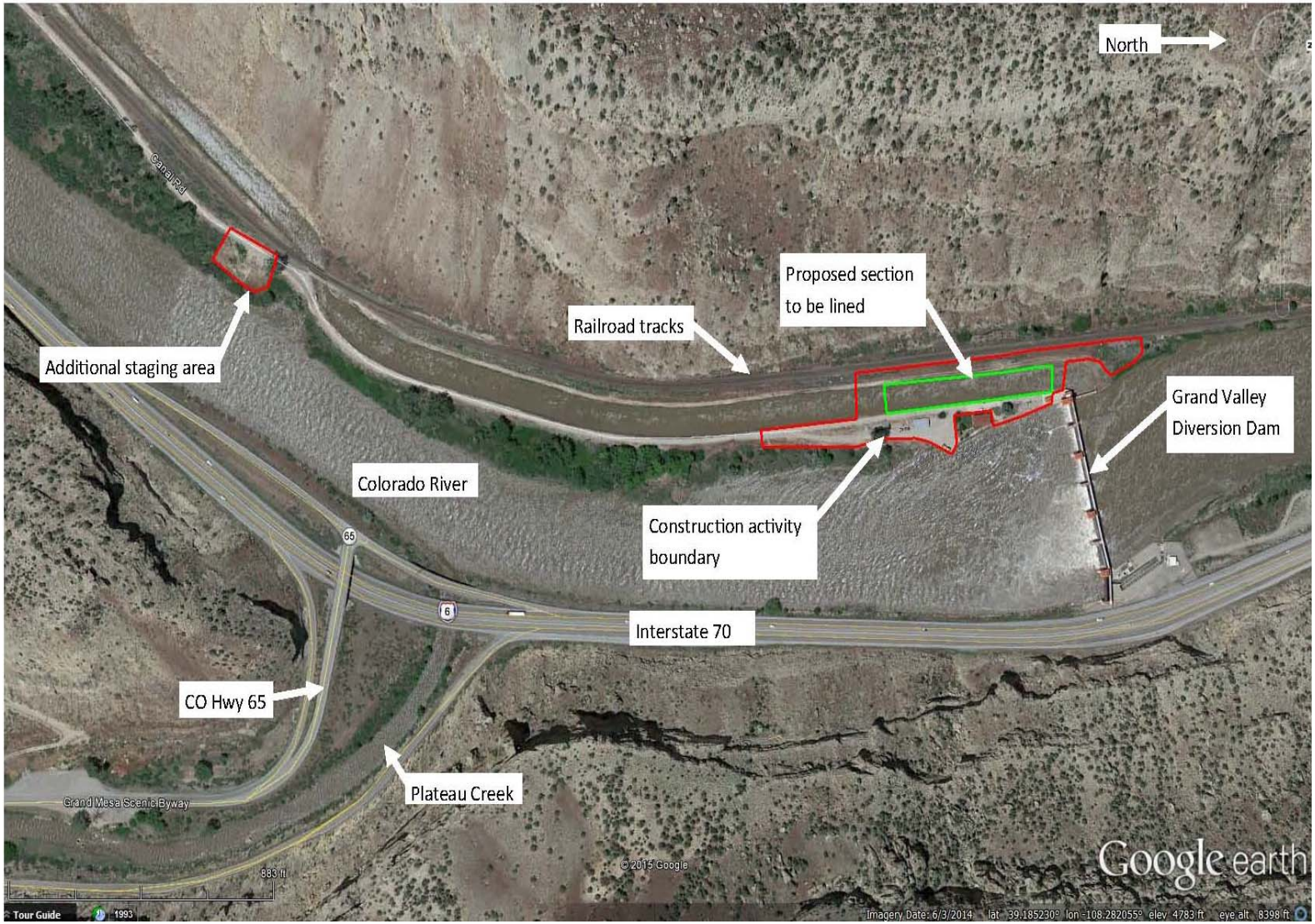


**Figure 9. Aerial View of the Project Area of Influence/Construction Activity Boundary and Staging Areas (Excerpt from Reclamation Drawing, 2015).**

#### 1.3.2.1 NEPA

GVWUA and Reclamation are coordinating on the necessary NEPA Environmental Assessment resource investigations for this Project. See Section 2.0 for additional information regarding cultural and environmental resources.

#### 1.3.2.1 Power Generation

The completion of this Project will be accomplished in the first few weeks that the GVPP is down for rehabilitation in 2017 hence minimizing the loss of energy production and costs/penalties.

## 1.4 Evaluation Criteria

This section thoroughly addresses the applicable criterion in the order presented as requested in the FOA, Section V, Technical Proposal: Evaluation Criteria, for ONLY those criteria that apply and benefit from this Project.

### 1.4.1 Evaluation Criterion B: Energy-Water Nexus

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

The primary performance objective of this Project is to increase the capacity of the Canyon Canal by at least 100 cfs through the installation of a canal liner, an improved canal cross section, and overall improved capacity, thus allowing for the full diversion and delivery of the Cameo Call water rights in the Canyon Canal. The GVPP, which is a component of Reclamation's Grand Valley Project, is operated jointly by GVWUA and OMID. The GVPP will be a major beneficiary of the increased capacity in the Canyon Canal.

There is strong "Energy-Water Nexus" supported and expanded by this Project. This Project will enable increased renewable energy production at the GVPP while at the same time allowing for the expanded use of the GVPP for multiple benefits. There is a very real potential to benefit multiple interests and objectives by recognizing and expanding this Energy-Water Nexus. In summary, this Project will:

- Support the increase of the energy capacity of the GVPP from 3.5 MW to 4.1 MW
- Provide a protective mechanism by which water rights from upstream sources can be delivered to the 15 Mile Reach

A summary of how this Project will implement renewable energy related to improved water management and delivery is provided below.

Olsson Associates was retained by GVWUA to conduct a power capacity study supporting the additional capacity potential at the GVPP. This report is available upon request. This report provides the calculations and details supporting this power expansion potential. Table 4. Available Power Canal Capacity (Olsson Associates Canal Capacity Study, 2015, Appendix E). illustrates the estimated available capacity within the power canal based on the assumptions outlined in the Olsson Associates report.

The GVPP is operated and maintained jointly by GVWUA and OMID pursuant to an LOPP entered into in 2010 with Reclamation. GVWUA and OMID are responsible for diverting and delivering the Grand Valley Project power right (400 cfs during the irrigation season and 800 cfs during the non-irrigation season) to promote beneficial, optimal, and productive use at the GVPP. The GVPP is currently a 3.5 MW facility. In addition to producing renewable energy the GVPP provides a protective mechanism by which water rights from upstream sources can be delivered to the 15 Mile Reach using procedures established in the Orchard Mesa Check case (document available upon request). This protective mechanism may also provide a means by which innovative water savings and efficiencies by both GVWUA and OMID and others may be put to use for power production and then be released from the after bay of the GVPP directly to the 15 Mile Reach.

GVWUA recently completed an investigation into the available excess capacity at the GVPP and in the Orchard Mesa power canal that delivers water to the GVPP from the Canyon Canal. This investigation, conducted by Olsson Associates in the fall of 2015, supports the feasibility of rehabilitating the GVPP to both improve the efficiency of the GVPP and expand production capability to 4.1 MW.

The use of that capacity has several benefits:

- Improved operational efficiencies at the GVPP will be increased due to maximized use of the facility.
- Excess capacity can provide a protective mechanism for “saved” water made available through water banking or other innovative water conservation methods and system improvements.
- Water that passes through the GVPP is available for release into the 15 Mile Reach where it will benefit the endangered fish.

The preliminary design and cost projections for the GVPP rehabilitation project have been completed. NEPA compliance is also underway. Funding for 20% of the roughly $5 million dollar project has been secured through Reclamation, a stakeholder group is working on a funding plan to secure additional funds, and the remaining costs will be paid by GVWUA and OMID using a combination of cash and loans. Construction is planned to begin in the fall of 2017 and be completed in twelve months.

**Table 4. Available Power Canal Capacity (Olsson Associates Canal Capacity Study, 2015, Appendix E).**

| Source | Year | Apr | May | Jun | Jul | Aug | Sep | Oct | Yearly Total |
|---|---|---|---|---|---|---|---|---|---|
| CDWR | **1997** | 774 | 2,292 | 2,690 | 5,831 | 1,299 | 1,412 | 1,359 | 15,657 |
| CDWR | **1997** | 2,482 | 4,298 | 3,072 | 5,323 | 1,998 | 1,750 | 1,122 | 20,046 |
| CDWR | **1998** | 5,651 | 1,260 | 1,329 | 4,170 | 2,800 | 2,191 | 2,312 | 19,714 |
| CDWR | **1999** | 7,417 | 2,282 | 2,936 | 2,237 | 1,389 | 6,773 | 4,287 | 27,320 |
| CDWR | **2001** | 4,355 | 4,156 | 5,196 | 9,917 | 11,131 | 9,678 | 4,837 | 49,270 |
| CDWR | **2002** | 9,693 | 2,159 | 2,121 | 4,091 | 1,922 | 1,115 | 565 | 21,665 |
| CDWR | **2003** | 1,715 | 1,145 | 2,150 | 1,807 | 4,274 | 4,120 | 1,580 | 16,789 |
| CDWR | **2004** | 2,541 | 1,008 | 1,238 | 697 | 1,402 | 1,520 | 1,417 | 9,824 |
| CDWR | **2005** | 1,972 | 2,518 | 3,404 | 1,696 | 2,733 | 1,975 | 1,853 | 16,152 |
| OMID | **2007** | 801 | 1,337 | 2,961 | 1,914 | 2,055 | 1,722 | NA | 10,737 |
| OMID | **2008** | 1,836 | 1,914 | 1,787 | 2,809 | 2,934 | 2,590 | 2,701 | 16,362 |
| OMID | **2012** | 4,596 | 1,662 | 3,152 | 7,414 | 7,414 | 7,087 | 2,908 | 34,080 |
| OMID | **2013** | 19,464 | 5,685 | 4,163 | 7,117 | 3,719 | 1,853 | 3,719 | 45,657 |
| CDWR | **2014** | 7,512 | 1,811 | 1,293 | 1,973 | 967 | 1,073 | 392 | 15,022 |
| | | | | | | | **Yearly Min** | | **9,824** |
| | | | | | | | **Yearly Max** | | **49,270** |
| | | | | | | | **Yearly Avg** | | **22,735** |

**Notes:**

Only years with data for greater than 85% of days within irrigation season represented, missing data not represented in Totals

"NA" represents a month with no data

Months with "NA" not reflected in Yearly Total column

CDWR and OMID gages located at same site, measuring device and rating curves differ

2007 CDWR data has been omitted from this table due to an inconsistency in the data

The completion of the Canyon Canal Improvement Project will be accomplished in the first few weeks that the GVPP is down for rehabilitation in 2017, thus minimizing down time and the loss of energy production.

### 1.4.2 Evaluation Criterion C: Benefits to Endangered Species

This project will benefit the four endangered fish federally-recognized in the 15 Mile Reach of the Colorado River (Table 5). This project will directly support the recovery of threatened or endangered species or address designated critical habitats.

**Table 5. Endangered Fish in the 15 Mile Reach.**

| Species | Listing |
|---|---|
| Colorado pikeminnow *Ptychocelius Lucius* | Endangered |
| Humpback chub *Gila cypha* | Endangered |
| Bonytail *Gila elegans* | Endangered |
| Razorback sucker *Xyrauchen texanus* | Endangered |

1. *What is the relationship of the species to water supply?*

GVWUA, Reclamation, and the Upper Colorado River Endangered Fish Recovery Program have a long and successful collaborative history. The 15 Mile Reach of the Colorado runs from just below the Grand Valley Irrigation Company diversion dam near Palisade, Colorado, to the confluence of the Colorado and Gunnison Rivers further west in the Grand Valley. The tail race of the GVPP discharges to the Colorado River at the head of the 15 Mile Reach. Increasing the river flows in this reach of the Colorado River has been identified as being critical to the recovery and down listing of the following four species of endangered fish.

System improvements to Grand Valley Project facilities and more efficient operations have allowed for average annual foregone diversions in excess of 46,000 Acre-Feet (AF) as determined by Reclamation for the years 2002-2013, the last year for which data is available. Most of these foregone diversions have been directed to and have flowed through the 15 Mile Reach. As a result of these efforts, combined with the administrative and operational opportunities for enhanced water management established by the Orchard Mesa check case, Colorado River flows in the Grand Valley have been greater and more consistent in recent years.

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

Water diverted under the Grand Valley Project power right is generally returned to the Colorado River at the head of the 15 Mile Reach after it is used to produce power at the GVPP. In addition, the Orchard Mesa Check Case allows other water that is available to help the endangered fish to be used for hydropower at the GVPP and released to the 15 Mile Reach after discharge from the GVPP tail race.

However, the capacity limitations in the Canyon Canal impede the optimization and flexibility of these important operations. By adding 100 cfs of capacity to the upper reaches of the Canyon Canal, the Canyon Canal Improvement Project will allow more water to be diverted under the Grand Valley Project power right to run through the GVPP, which water can then be released to the Colorado River at the head of the 15 Mile Reach. In addition, pursuant to the Orchard Mesa check case and other Recovery Program operations, water in upstream reservoirs such as Green Mountain Reservoir is released to benefit the endangered fish in the 15 Mile Reach. This water can be protected from diversion by upstream water rights by running it through the GVPP to produce power and then releasing it to the 15 Mile Reach to benefit the endangered fish.

3. *How is the species adversely affected by a Reclamation project?*

The water rights held by the "Cameo Call" when exercised to their maximum can use a majority of water in the Colorado River, potentially causing a "hole" in the river hence the need for the Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River Above the Confluence with the Gunnison River (December 1999) to protect the four fish species. GVWUA is a long-time partner of the Recovery Program.

4. *Is the species subject to a recovery plan or conservation plan under the ESA?*

Yes. The Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River Above the Confluence with the Gunnison River, Appendix C, addresses the four endangered fish (December 1999).

5. *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 increases the likelihood of the down-listing of these species through the release of water at the upstream terminus of the 15 Mile Reach.

By increasing the capacity of the Canyon Canal, the Canyon Canal Improvement Project will help maximize the amount of water that can be called and delivered to the Dam and Canyon facilities. This in turn will help maximize the amount of water that can be delivered to the GVPP to produce renewable energy and then to the 15 Mile Reach to help in the recovery of the endangered fish.

Adding the 100 cfs capacity made possible by the Canyon Canal Improvement Project facilitates innovative means of potentially temporarily reducing irrigation demand under the Grand Valley Project's Government Highline Canal. GVWUA has recently completed an Operational Assessment of GVWUA's ability to produce, capture, and deliver conserved consumptive use (CCU) from rotational fallowing,

deficit irrigation and other means and to protect that conserved water by routing it to the GVPP. According to another study recently completed by GVWUA, there is capacity in the GVPP to accommodate up to 10,000 AF of conserved consumptive use. The additional capacity made available by the Canyon Canal Improvement Project will allow the GVPP to combine the increased water made available by improved Canyon Canal hydraulics with potential CCU or water saved by other water banking activities. The ability to mix and match available water from several sources on a real time basis increases the ability of GVWUA and OMID to identify, commit, and deliver water for the benefit of the 15 Mile Reach on more occasions.

In 2016 GVWUA will be conducting further legal, technical, and administrative investigations that will refine the combined operations of GVWUA and OMID, potential water banking activities, and environmental and river administrative concerns to capitalize on the increased capacity in the Canyon Canal made possible by the Canyon Canal Improvement Project and other system improvements underway or planned by the two organizations. Please see Criterion H in Section 1.4.7 for a full description of the current Reclamation-related activities of GVWUA and OMID.

### 1.4.3 Evaluation Criterion D: Water Marketing

This section addresses how this Project can pursue water marketing to make the conserved water available to meet other existing water supply needs or uses outside of the entity's geographic service area. In summary this Project could:

- *Provide a potential for 40,000 AF annually (the continued diversion of 100 cfs for a 200 day irrigation season could potentially facilitate the improved control, measurement, management, and productive use of 40,000 AF annually)*
- *Provide a mechanism of a new water market either through rotational fallowing, deficit irrigation, system improvements, or other means*
- *Benefit 40,000 known users within the Grand Valley Project plus the unquantified potential benefits to the Upper and Lower Colorado Basin users*

The water marketing potential within the Project area is being discussed as part of ongoing water banking discussions. There are some legal issues pertaining to the water market potential and are being discussed with Reclamation and other groups representing the State water laws have been actively engaged. There are no legal issues associated with the additional power capacity potential of the GVPP.

**Water Market Potential**

This Project can help facilitate the development of a water market for water made temporarily available by rotational fallowing, deficit irrigation, system improvements, or other means. The additional 100 cfs realistically made available to the system by this project could be temporarily used for other purposes and monetized via a mutually beneficial agreement between the United States, GVWUA and OMID and a willing new user. Improved capacity realized by this project and the related benefits

can also stimulate and enable additional innovative ideas by providing a means of delivering water to the Roller Dam for multiple beneficiaries and uses.

Adding the 100 cfs capacity made possible by this project facilitates innovative means of potentially temporarily reducing irrigation demand under the Grand Valley Project's Government Highline Canal. GVWUA has recently completed an Operational Assessment showing the feasibility of its ability to produce, capture, and deliver conserved consumptive use (CCU) from rotational fallowing, deficit irrigation, and other means and to protect that conserved water by routing it to the GVPP (Table 1. Irrigated Cropland, NASS 2014. According to another study recently completed by GVWUA, there is capacity in the GVPP to accommodate well over the projected 10,000 AF of conserved consumptive use (Table 4. Available Power Canal Capacity (Olsson Associates Canal Capacity Study, 2015, Appendix E). The additional capacity made available by this project will allow the GVPP to combine the increased water made available by improved Canyon Canal hydraulics with potential CCU or water saved by other water banking activities. The ability to mix and match available water from several sources on a real time basis increases the ability of GVWUA and OMID to identify, commit, and deliver water for the benefit of the 15 Mile Reach or other uses on more occasions.

In order to capitalize on the increased capacity in the Canyon Canal made possible by this project and other system improvements underway or planned by GVWUA and OMID, these entities are conducting further legal, technical, and administrative investigations in 2016. These investigations will address a variety of issues including but not limited to: the combined operations of GVWUA and OMID; potential water banking activities; and environmental and river administrative concerns. Included in the studies is the Roller Dam Master Plan of which the Canyon Canal Improvement Project is a major component. Please see Criterion H in Section 1.4.7 for a full description of the current Reclamation-related activities of GVWUA and OMID.

**Water Marketing Mechanism**

GVWUA has been cooperating in water banking investigations for several years. For the past two years it has been actively involved with the Colorado Water Banking Work Group investigating options for water banking and system conservation. These investigations have included research into the potential benefits and costs to GVWUA and the identification of other potential beneficiaries including municipalities, agriculture and rural interests, environmental, recreational, and community interests, and agencies of the U.S. and Colorado State governments.

In addition to the activities of the Colorado Water Banking Work Group, various other efforts are ongoing in both the Upper and Lower Basins of the Colorado River to implement system conservation and demand management measures in order to reduce consumptive use and increase the amount of water stored in Lakes Powell

and Mead. Any of these ongoing activities and efforts could lead to the development of programs involving rotational fallowing of irrigated lands in the Grand Valley or other methods of reducing consumptive use. However, in order for this to provide the intended benefits, there must be some means to ensure that the saved consumptive use is delivered to and past the Grand Valley and not diverted by other water users upstream.

The Orchard Mesa Check Case allows for a unique protective mechanism for reduced irrigation demand and other system conservation efforts using the power right for the GVPP, provided that the Canyon Canal and the GVPP can accommodate such increased use. The decree in the Check Case provides that the the power right for the GVPP normally cannot call during the irrigation season. However, it can call if diversions under the irrigation water rights at the Roller Dam fall below 1,310 cfs. Thus, if the irrigation demand on the lands of the Grand Valley Project is reduced, the power right can be exercised to divert the conserved consumptive use and run that water through the GVPP. After it produces this renewable energy power, the water is then discharged at the head of the 15 Mile Reach, which benefits the endangered fish.

In summary, when the Grand Valley Project power right is calling, it brings more water down the Colorado River, which helps maintain flows in the Colorado River above the Grand Valley, helps produce power through a renewable energy source, and benefits the endangered fish in the 15 Mile Reach. The Canyon Canal Improvement Project will make additional capacity available in the Canyon Canal to maximize these benefits.

The Olsson Associates GVPP capacity study completed in the fall of 2015 verifies that excess capacity does exist at the GVPP as discussed above. A primary objective of the Canyon Canal Improvement Project is to firm up the Cameo Call senior water rights by allowing a full diversion capacity in the Canyon Canal. That additional capacity can then be used to add flexibility to accommodate innovative water sharing ideas as they become possible, such as the use of the decree in the Orchard Mesa Check Case to protect CCU and make hydropower and then return the savings to the 15 Mile Reach. GVWUA investigated the operational feasibility of creating CCU under the Highline Canal in the summer of 2015. This investigation supports the feasibility of a scalable CCU program administered by GVWUA. GVWUA plans to conduct further investigations regarding program specifics in 2016.

Another realized benefit related to the potential increased profitability of the GVPP due to increased water supply is the improved financial sustainability of the GVPP. Power revenues assist GVWUA and OMID to continue to invest in the infrastructure needs of the GVPP, thus assuring the sustainability of the power water right and the Check Case protective mechanism for capturing CCU and delivering it to the 15 Mile Reach. Reducing the restrictions in the top 500 feet of the Canyon Canal accomplished by this Canyon Canal Improvement Project dramatically increases the

chances of success for these innovative efforts in the Grand Valley to come to fruition.

GVWUA and OMID will continue to pursue expanded water stewardship objectives in 2016 and beyond in cooperation with Reclamation, the State of Colorado, and other Colorado Basin interests. The increased capacity in the Canyon Canal that will result from the Canyon Canal Improvement Project will be a critical factor in achieving these objectives.

### 1.4.4 Evaluation Criterion E: Other Contributions to Water Supply Sustainability

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

This section provides a detailed description of how the Project is addressing an adaptation strategy specifically identified in the Reclamation's Upper Colorado and Lower Colorado Regions Basin Study.

Reclamation's Upper Colorado and Lower Colorado Regions (Figure 10), in collaboration with representatives of the seven Colorado River Basin States (non-federal Cost Share Partners), submitted a Proposal in June 2009 to fund the "Colorado River Basin Water Supply and Demand Study" (Study) under Reclamation's Basin Study Program. In September 2009, the Study was selected for funding. The Study, which began in January 2010, was completed in December 2012. It defined current and future imbalances in water supply and demand in the Colorado River Basin (Basin) and the adjacent areas of the Basin States that receive Colorado River water for approximately the next 50 years, and developed and analyzed adaptation and mitigation strategies to resolve those imbalances. The Study characterized current and future water supply and demand imbalances in the Basin and assessed the risks to Basin resources. Resources include water allocations and deliveries consistent with the apportionments under the Law of the River; hydroelectric power generation; recreation; fish, wildlife, and their habitats (including candidate, threatened, and endangered species); water quality including salinity; flow- and water-dependent ecological systems; and flood control.

The Study indicated that targeted investments in water conservation, reuse, and augmentation projects can improve the reliability and sustainability of the Colorado River system to meet current and future water needs. Ultimately, the Study is a call to action. Significant additional efforts are required immediately to implement the water conservation, reuse, and augmentation projects identified in the Study.

In summary, there are four future actions that must take place to move closer towards implementing solutions to resolve imbalances in the Basin.

- *First, significant uncertainties related to water conservation, reuse, water banking, and weather modification concepts must be resolved in order to adequately implement these approaches.*


**Figure 10. Upper and Lower Colorado River Basins (Reclamation, 2012).**

This Project promotes the implementation of this action by addressing the water efficiency and conservation of water diverted at the Roller Dam which will promote firming of water rights associated with the Cameo Call, which will provide benefits for and assist the Recovery Program, water quality improvements and water banking efforts (as discussed in Section 1.4.4.1).

- *Second, costs, permitting issues, and energy needs relating to large-capacity augmentation projects need to be identified and investigated through feasibility-level studies.*

This Project promotes the implementation of this action through continued investigations and feasibility studies, specifically efforts to promote the capacity of the Grand Valley Power Plant and associated Canyon Canal and Power Canal efficiencies (as discussed in Sections 1.4.1, 0, and 1.4.3).

- *Third, opportunities to advance and improve the resolution of future climate projections should be pursued and enhancements to the operational and planning tools used in the Colorado River system to better understand the vulnerabilities of the water-dependent uses, including environmental flows, should be explored.*

This Project promotes the implementation of this action through its Water Banking conversations and improvements to the delivery of allocated water (as discussed in Section 0).

- *Fourth, as projects, policies, and programs are developed, consideration should be given to those that provide a wide-range of benefits to water users and healthy rivers for all users.*

This Project promotes the implementation of this action through continued investigations and feasibility studies, active involvement in the Colorado Basin Roundtable and Statewide Colorado Water Plan implementation through the Water Management Plan, Master Plan, and GVPP projects (as discussed in Sections 1.2.4 and 1.4.1.1).

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

This Project will address the imbalance between water supply and demand through the enhanced delivery of approximately 100 cfs more water. This additional water will be made available to the system by these improvements due to improved hydraulics provided by improving the hydraulic characteristics and lining of this section of Canyon Canal. During periods of low river flow improved diversion efficiency will make full diversion of all of the water rights that make up the Cameo

Call right possible. This Project will also make it possible to call more water from the headwaters of the Colorado River to the Grand Valley for use of non-consumptive hydropower purposes. Once this water is used to produce hydropower, it will be released back to the Colorado River to help meet downstream demands.

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

GVWUA, Reclamation, Recovery Program staff, OMID, PID, MCID, Grand Valley water users, Colorado Water Conservation Board, Colorado River Water Conservation District, and Colorado Basin Roundtable stakeholders coordinate regularly regarding the overarching needs of the Colorado River Basin both within Colorado and the entire Upper and Lower Basin system. The coordination has been focused on meeting the objectives of the various stakeholders, while realizing the importance of the Basin Study's action items, in addition to the Colorado Water Plan's objectives and needs.

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

As discussed above, the WaterSMART Basin Study Program staff, local Reclamation staff, Colorado River Basin partners and stakeholders, and State of Colorado will continue to comprehensively evaluate opportunities to meet future water demands within the Basin.

#### 1.4.4.2 E.3: Other Water Supply Sustainability Benefits

This section provides information regarding the additional expected project benefits and their significance. This project will help alleviate shortages resulting from drought and are further expanded upon below, highlighting these areas mentioned in the FOA:

- *Explain in detail the existing or recent drought conditions in the project area.*
- *Describe the impacts that are occurring now or are expected to occur as a result of drought conditions.*
- *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.*
- *Provide a detailed explanation of how the proposed WaterSMART Grant project will improve the reliability of water supplies during times of drought.*

Since 2000, the Colorado River Basin (Basin) has been experiencing a historic, extended drought that has impacted regional water supply and other resources, such as hydropower, recreation, and ecologic services. During this time, the Basin has experienced its lowest 16-year period of inflow in over 100 years of record keeping, and reservoir storage in the Colorado River system has declined from nearly full to about half of capacity. Concern is growing about the impacts of the

ongoing drought and declining reservoir levels, such as decreasing water supply and the possibility of a first-ever shortage condition of drinking water for the Lower Basin; decreasing hydropower capacities at Lake Powell and Lake Mead; the potential for loss of hydroelectric generation at Lake Powell; reduced recreational opportunities; and changes to in-stream flows that support ecosystems.

The 10-year running average natural flow at Lee Ferry shows periods of below and above average annual flow (approximately 14.8 million acre-feet [maf]). The 2000-2015 period was the driest 16-year period in the past 100 years and one of the driest 16-year periods in the past 1,200 years. The early part of the 1900s, which corresponds to the period of reference used to set the apportionments for the Upper and Lower Basins in the 1922 Colorado River Compact, was an unusually wet period. At the time the 1922 Colorado River Compact was signed, the average annual inflow at Lees Ferry during the pre-Compact period (1906-1921) was approximately 18.0 maf.(https://www.doi.gov/water/owdi.cr.drought/en/).

In response to drought conditions, Federal agencies and stakeholders throughout the Basin have been working together to find creative ways to reduce the effects of the drought on the people and resources that rely on water from the Colorado River.

In Colorado there have been statewide drought planning tools developed through the preparation and implementation of the Colorado Drought Mitigation and Response Plan (DMRP). In 2010, the DMRP went through a comprehensive revision and was again updated in 2013. The updated plan provides a blueprint for how the state will monitor, mitigate and respond to drought.

The plan consists of four components: monitoring, assessment, mitigation, and response. Monitoring is ongoing and accomplished, at a minimum, by regular meetings of the Water Availability Task Force (WATF). The 2013 DMRP is also incorporated into the Colorado Water Plan http://cwcb.state.co.us/water-management/drought/Pages/StateDroughtPlanning.aspx).

Overall, this Project provides drought resiliency.

1. *Will the project make water available to address a specific concern? Will the project directly address a heightened competition for finite water supplies and over-allocation (e.g., population growth)?*

**Yes. This Project provides water and water rights benefits to multiple parties.** The efficient management and use of Grand Valley Project water protects a large volume of Pre-Compact rights, promotes Compact compliance, furthers Intrabasin agreements to which the State of Colorado is obligated, and improves reservoir management for the Historic Users Pool (HUP) in Green Mountain Reservoir and the efficient management of all related reservoirs on the Colorado system, while causing no damage to water rights and water users within or without Grand Valley Project.

All water users within the Grand Valley Project (all Pre-Compact water rights) will benefit from the Canyon Canal Improvement Project. The Irrigation Districts are direct beneficiaries of the improved hydraulic efficiencies created. Via the Orchard Mesa Check Case Grand Valley Irrigation Company is the indirect beneficiary of increased Canyon Canal and related hydraulic efficiencies.

Local municipal providers will continue to have increasing benefits from a steady supply of irrigation water for their customers thus reducing the need for collection and treatment of increased amounts of domestic water.

Improved identification measurement, management, and stewardship of Project water supplies will help assist GVWUA in the search for productive solutions to the pressing problems created by population growth and climate change. The Canyon Canal Improvement Project supports continued and enhanced benefits for environmental interests, Recovery program objectives, wildlife, and those seeking to preserve the scenic beauty of the Colorado River.

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

See narrative at the beginning of this section specific to the Colorado River flows and drought.

3. *Will the project help to address an issue that could potentially result in an interruption to the water supply if unresolved?*

**Yes.** See narrative in this section specific to Lake Powell and Lake Mead reservoir levels; Section 0 for discussion of potential issues to endangered fish; and Section 1.4.1 for discussion of potential issues related to the GVPP.

4. *Will the project make water available for rural or economically disadvantaged communities?*

**Yes, this Project supports economic development.** The Canyon Canal Improvement Project enhancements to the viability and flexibility of the GVP supports commercial agriculture, community, and civic activity in the Grand Valley and ensures the robustness of the rural community and economic vitality of the entire Valley. The Cameo Call provides the required irrigation water for schools, parks, churches, business, and thousands of urban and suburban Grand Valley citizens. The attractiveness of the Grand Valley for existing business expansion and new business creation and relocation is enhanced by the environment and quality of life made possible by irrigation water made more secure and resilient by the Canyon Canal Improvement Project. The Grand Valley without irrigation water would be an unimaginably different place to live and work.

5. *Does the project promote and encourage collaboration among parties?*

**Yes, this Project supports commercial agriculture, benefits non-consumptive water users; and encourages collaborative solutions to water sustainability issues.**

**Commercial agriculture -** While all of these efforts are of great value, the Grand Valley Project continues to deliver significant volumes of water to commercial agriculture. The fresh fruit, vegetable, wine, nursery, corn, wheat, dry bean, seed, alfalfa, pasture grass, beef, and equine industries in the Grand Valley all depend upon reliable, consistent deliveries of irrigation water in face of challenges of climate change, periods, of drought, and population pressure. The efficiencies and flexibility gained by the Canyon Canal Improvement Project support the GVP's continued delivery of the most fundamental supporting input to production agriculture in the Grand Valley water.

**Non-consumptive water uses -** The Canyon Canal Improvement Project assures continued delivery of significant water to the 15 Mile Reach and beyond. The Grand Valley Project system has been successful in far exceeding the expected forgone diversions from the improvements that have been made to the system, while at the same time not reducing system deliveries. To continue to do will require increased attention to all facets of canal facilities, management, and operations in the future such as this Canyon Canal Improvement Project. These deliveries to the Colorado River through the 15 Mile Reach, as outlined in detail in Section 0, also benefit recreational use, wildlife habitat, and the beauty and overall aesthetic value of a large section of the Grand Valley that is receiving increasing attention from the community.

**Encouraging collaborative solutions to water sustainability issues –** GVWUA is working to address water supply sustainability in the face of changing demographic and environmental concerns exacerbated by increasing urbanization locally and regionally. Water conservation and the concerns over increasing pressure on water supplied by the Colorado River require that GVWUA stay ahead of the demands and plan for demographic changes and drought and climate changes.

GVWUA and OMID must blend the need for improvements to the Grand Valley Project and the needs and potential benefits of other resource and economic communities. By developing comprehensive, prioritized, flexible water management and facilities improvements GVWUA and OMID can protect the interests of the Grand Valley Project while expanding the number of water users who benefit from improvements in the facilities and operations of the Grand Valley Project. Such benefits may be of sufficient magnitude that they be of monetary value to others. Improved canal facilities, administration, and operations can lead to maximizing water availability for all the Grand Valley Project partners and beneficiaries. Maximizing effectiveness, efficiency, and stewardship of water management have long term positive benefits to the environment, recreation and irrigation users, and the economies and general social and civic well-being of the entire Grand Valley, and indeed the entire Colorado River system and those who rely upon it.

GVWUA and OMID want to continue their progress in incorporating their rights and responsibilities into the goals and objectives of Reclamation, the Colorado River Cooperative Agreement and other contractual and policy obligations, and of others who may be potential beneficiaries of improved water practices. We want to prepare our organizations, and those who depend upon our productive management of the water resources in our trust, for the environmental, social, and political changes taking place in Colorado Basin.

6. *Will the project increase awareness of water and/or energy conservation and efficiency efforts? Will the project serve as an example of water and/or energy conservation and efficiency within a community? Will the project increase the capability of future water conservation or energy efficiency efforts for use by others? Does the project integrate water and energy components?*

**Yes, this Project will increase the awareness of water efficiency benefits.** Educating and being educated by the broader community is a critical component to the activities of GVWUA and OMID. Over the last 24 months GVWUA and OMID have been actively involved in the pursuit of innovative approaches to on-farm and system wide water management practices. These activities have included involvement from GVWUA with irrigation water users and other entities including: the Colorado River Conservation District, The Water Banking Work Group, the Nature Conservancy, the Environmental Defense Fund, Colorado State University, Ditch and Reservoir Company Alliance (DARCA), the Recovery Program, and Reclamation. Parties on all sides of these conservation efforts have been more broader informed and more engaged in a collaborative approach to the pressing issues facing the Colorado River and those who rely upon it regardless of their respective resource or economic interests. Such activities will continue throughout this planning process.

7. *Is there widespread support for the project? What is the significance of the collaboration/support? Will the project help to prevent a water-related crisis or conflict? Is there frequently tension or litigation over water in the basin? Is the possibility of future water conservation improvements by other water users enhanced by completion of this project?*

**Yes, there is widespread support for this project as mentioned throughout this grant application.** The success of this Project depends upon the continued support for the protection of the Cameo Call and the Grand Valley Project facilities (as discussed in the sections above). The protection of the Cameo Call is viewed as a Top Basinwide Project as identified in the Basin Implementation Plan of the Colorado Basin Roundtable and GVWUA has received funds to begin planning future upgrades to the Roller Dam and Canyon facilities to avoid a water-related conflict and litigation over Colorado River water availability and issues. The protection and maintenance of the Cameo Call is also critical for the success of the

water banking and system conservation efforts discussed in other sections of this grant application.

This Project will not have any effect, either positive or negative, on water available for Indian tribes.

### 1.4.5 Evaluation Criterion F: Implementation and Results

#### 1.4.5.1 F.1: 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 the priority of this project in relation to other potential projects.*

- Colorado Basin Implementation Plan (BIP) 2013 (https://www.colorado.gov/pacific/sites/default/files/CBIP-April-17-2015.pdf)
- Colorado Water Plan (CWP) 2015 (http://coloradowaterplan.com/)
- Colorado Drought Mitigation and Response Plan (DMRP) 2012 (http://www.usbr.gov/lc/region/programs/crbstudy.html)
- Colorado River Basin Water Supply and Demand Study (Study) under Reclamation's Basin Study Program 2013 (http://www.usbr.gov/lc/region/programs/crbstudy.html)
- GVWUA Water Management Plan 2015
- Reclamation's Sustainable Energy Mission 2012 (https://www.usbr.gov/power/Reclamation%20Sustainable%20Energy%20Strategy%20.pdf)
- Colorado River Cooperative Agreement 2013 (http://www.denverwater.org/SupplyPlanning/Planning/ColoradoRiverCooperativeAgreement/)
- Master Plan for the (BIP) Roller Dam Rehabilitation 2015

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).*

- Colorado Basin Implementation Plan (BIP) 2013

The Colorado BIP identified how future municipal, industrial, agricultural, recreational and environmental water needs will be met through existing or new projects, policies, and processes to the year 2050. The CBRT members worked alongside citizens and Colorado River Basin stakeholders to identify top projects across the basin and within each of the seven subregions. Projection of the Cameo Call and rehabilitation of the Roller Dam and facilities was one of the top projects. This Project is one of the first steps in meeting the needs of the Colorado Basin users and protecting the Cameo Call.

- Colorado Water Plan (CWP) 2015

The CWP is a roadmap that leads to a productive economy, vibrant and sustainable cities, productive agriculture, a strong environment, and a robust recreation industry. It sets forth the measurable objectives, goals, and actions by which Colorado will address its projected future water needs and measure its progress—all built on our shared values. Just as it was created, this plan will be implemented by working collaboratively with the basin roundtables, local governments, water providers, other stakeholders, and the general public. It includes a set of policies and actions that all Coloradans and their elected officials can support and help implement. The benefits of this Project were realized through the process that developed the CWP.

- Colorado Drought Mitigation and Response Plan (DMRP) 2012

Drought is real and the reality of water supply planning in the Project area. The DMRP was developed in response to drought conditions, Federal agencies and stakeholders throughout the Basin have been working together to find creative ways to reduce the effects of the drought on the people and resources that rely on water from the Colorado River. GVWUA is part of these conversations and efforts.
The 2013 DMRP is incorporated into the Colorado Water Plan which is a blueprint for how to mitigate drought impacts. This Project was initiated as a result of these realizations (of drought) and the need to promote protection of the Cameo Call in light of the pending reality of less water.

- Colorado River Basin Water Supply and Demand Study (Study) under Reclamation's Basin Study Program 2013

This Project meets the four actions described at the beginning of this section on pages 31 and 33.

- GVWUA Water Management Plan

The goal of this WMP is to evaluate the prioritized facility needs and potential operational enhancements of GVWUA within the Gravity Division of the Grand Valley Project. This Project is addressing both the facility needs and considers the benefits of providing additional water via improve Canyon Canal efficiencies to the Grand Valley Project.

- Reclamation’s Sustainable Energy Strategy FY 2013-2017

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 this objective specifically include the use of WaterSMART grants to “provide cost-share assistance to support the development of renewable resources”. This Project aligns with this objective.

- Colorado River Cooperative Agreement 2013

This agreement provides for:

- Resolution of historic conflicts and a holistic approach to resolving Colorado water disputes.
- Cooperative, long-term efforts to improve the health of the Colorado River mainstem and its tributaries.
- Additional water supply for those who live, work and play on the West Slope and for customers of Denver Water.

This Project aligns with the Colorado River Cooperative Agreement and GVWUA and OMID are both signatories to the agreement.

- Master Plan for the (BIP) Roller Dam Rehabilitation 2015

The overall purpose of this project is to protect the water rights associated with the "Cameo Call" by outlining and prioritizing the rehabilitation needs of the Roller Dam and the portion of the Government Highline Canal immediately below the Roller Dam (collectively referred to as the 'Dam and Canyon facilities'). Exercise of these water rights and the continued operation of the Dam and Canyon facilities provide predictability to river flows and associated environmental and cultural benefits. These benefits include more reliable flows in the upper portions of the Colorado River which improves water quality in the lower portions of the basin. The flows generated by the Cameo Call help provide water for recreational activities on the Colorado River and for riparian habitat and aesthetic values along the entire Colorado River corridor. Flows generated by the Cameo Call also assist the state in complying with its obligations under the Colorado River Compact and in maintaining acceptable lake levels in Lake Powell.

The Dam and Canyon Facilities Master Plan is the first step to understanding the rehabilitation needs of the Dam and Canyon facilities which aims to 1) identify and prioritize the rehabilitation needs (structural, cosmetic, additional hydropower potential, environmental, etc.); and 2) develop implementation plans for each prioritized need, specifically addressing the costs, funding opportunities, timeline, and list of potential teaming partners and sponsors.

This Project is the first rehabilitation need being addressed as part of the Master Plan.

#### 1.4.5.2 F.2: Readiness to Proceed

Table 6 provides the estimated project schedule including the major tasks, milestones, and dates. Under no circumstances will any ground-disturbing activities occur until the proper environmental clearance is complete and Reclamation authorizes the work to proceed.

**Table 6. Canyon Canal Improvement Project Estimated Project Schedule.**

| | 2015 | | 2016 | | | | 2017 | | | | 2018 | Milestones and Dates |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | **Q2** | **Q3** | **Q4** | **Q1** | |
| Reclamation Coordination | | | | | | | | | | | | |
| 1. Secure Funding (Commitments) | | | | | | | | | | | | Secure commitments; loan |
| 2. NEPA Compliance | | | | | | | | | | | | |
| Cultural Inventory and Survey | | | | | | | | | | | | Class III Cultural Resource Inventory |
| - SHPO Review & Findings Concurrence | | | | | | | | | | | | Concurrence |
| - ACHP Coordination and MOA | | | | | | | | | | | | MOA |
| - Submit Cultural Mitigation Document | | | | | | | | | | | | Approval |
| 3. Final Project Design | | | | | | | | | | | | |
| Survey | | | | | | | | | | | | |
| Develop 100% CDs | | | | | | | | | | | | |
| 4. Develop Bid Package and Contract Documents | | | | | | | | | | | | |
| Secure Contractor | | | | | | | | | | | | |
| 5. Permitting | | | | | | | | | | | | |
| Electrical Permit | | | | | | | | | | | | |
| 6. Approval to Start Construction | | | | | | | | | | | | |
| 7. Construct Project | | | | | | | | | | | | |

GVWUA is working with Reclamation staff on the cultural resources inventory and the development of the Environmental Assessment. Reclamation staff has also provided the preliminary engineering for the Project alternatives. GVWUA will continue to work with Reclamation staff on the final design.

#### 1.4.5.3 F.3: Performance Measures

Quantifying project benefits is an important means to determine the relative effectiveness of various water management efforts, as well as the overall effectiveness of WaterSMART Grants. This Project will document and quantify performance by measuring the amount of water delivered at various locations along the Canyon Canal system, ultimately recording the efficiency of the canal and reduction of past seepage losses. There is a USGS flow gage in the canal below the fish screen. Measurements are collected electronically. This flow gage will assist with the future measurement of project improvements. In addition the GVPP rehabilitation will allow for measurement of water delivered to this location.

In summary, the continued diversion of 100 cfs daily for the roughly 200 day irrigation season could potentially facilitate the improved control, measurement, management, and productive use of 40,000 AF annually.

#### 1.4.5.4 F.4: Reasonableness of Costs

Total project cost is estimated to be $800,000, including engineering, environmental and regulatory work, reporting and construction. The project will raise the efficiency of the Canyon Canal within the upper 500 feet to allow better flow management and higher diversion rates. Higher diversion rates are expected to reach up to 100 cfs of senior water rights through the irrigation season (April through October) that are currently not able to be diverted. On average these higher diversions are expected to allow an additional 20,000 to 40,000 AF of annual diversions for ditch owners including the Grand Valley Power Plant and irrigators.

Based on similar designed canal lining projects in the Grand Valley region, the Reclamation engineers expect the project to have a life expectancy of 50 years.

### 1.4.6 Evaluation Criterion G: Additional Non-Federal Funding

$$\frac{\text{Non-Federal Funding} = \$504{,}000}{\text{Total Project Cost} = \$800{,}000} = 0.63 \text{ or } 63\%$$

### 1.4.7 Evaluation Criterion H: Connection to Reclamation Project Activities

This section addresses the following items as identified in the FOA, specifically:

- How this Project is connected to Reclamation project activities.
- How the applicant receives Reclamation project water.
- How the project involves Reclamation facilities.

- The location of the project and proximity to a Reclamation project in the same basin.
- How the proposed work will contribute water to a basin where a Reclamation project is located.

This project will not assist the Reclamation in meeting trust responsibilities to Tribes.

GVWUA is the managing entity for the federally owned Grand Valley Project pursuant to contracts with Reclamation. The Grand Valley Project facilities include the Grand Valley Diversion Dam, known as the Roller Dam, on the Colorado River in DeBeque Canyon, the attendant headgate diversion structure, five miles of Canyon Canal, the Stub Ditch pump station, the 55-mile-long Government Highline Canal, 150 miles of project laterals, 100 miles of drainage ditches, and the Grand Valley Hydroelectric Power Plant operated by GVWUA and OMID under an LOPP with Reclamation.

GVWUA first delivered water in 1915 to lands under the GVP and since then has furnished a full supply of irrigation water to Project lands. The GVP facilities provide irrigation water for the Irrigation Districts and the Grand Valley Project's Government Highline Canal with combined acreages of over 39,000 acres. In addition, water is provided year round to the U.S. owned 3.5 MW GVPP which helps maintain critical stream flows in the 15 Mile Reach. GVWUA and OMID share in the cost of operation and maintenance of the Canyon Canal pursuant to a 1955 agreement, at 71.6% and 28.4% respectively. Daily operation of the Dam and Canyon facilities are conducted by GVWUA. OMID conducts the daily operations of its facilities and the GVPP. Each organization pays one-half of the associated operation and maintenance cost of the GVPP. GVWUA and OMID are in daily communication.

The Canyon Canal is an integral part of the GVP. The GVP facilities perform as an interdependent Reclamation facility. Improvements to the Canyon Canal assure an increased and more manageable water supply to the entire system. Water rights held by the U.S. are "firmed" up and Reclamation's obligations to the Recovery Program are supported by improving the performance of the upper 500 feet of the Canyon Canal. Approximately 100 cfs more water will be made available to the system by these improvements due to improved hydraulics and lining of this section of Canyon Canal. During periods of low river flow improved diversion efficiency will make full diversion of all of the water rights that make up the Cameo Call right possible.

A top priority of GVWUA is a long range facilities plan, including a proposed funding plan, to accommodate the highest priority needs for the GVP. Another top priority has been the protection of the GVP water rights. These concerns are priority issues for Reclamation also. These two issues are intertwined and both are addressed in GVWUA activities that have been recently completed and that are currently underway. GVWUA recently spent over $1.5 million on major repairs to the Roller Dam, the Stub pump, and other system improvements. GVWUA has spent tens of

thousands of dollars recently on the technical and legal work leading to the completion of several historic water related negotiations including the Colorado River Cooperative Agreement. GVWUA spent over $60,000 on water administration improvements, not including any in-kind contributions. GVWUA has recently completed an overall GIS mapping of the entire GVP delivery and drainage system that will inform the entire operation of that system.

Activities currently underway include:

1. **Water Management Plan** update is underway. The goal of this WMP is to evaluate the prioritized facility needs and potential operational enhancements of GVWUA within the Gravity Division of the Grand Valley Project.

2. GVWUA has undertaken $160,000 of replacement work on the **Stage 1 portion of the Government Highline Canal**. GVWUA performed approximately $40,000 of the work in FY 2015 and the remainder will be done in approximately equal parts in FYs 2016 and 2017.

3. GVWUA has been successful in its request for $3.6 million in salinity funding to line the middle section of **Reach 1A of the Highline Canal**, which is the one mile stretch beginning at the Palisade exit from Interstate 70. GVWUA is currently scheduled to receive about $1.5 million in salinity funding in FY 2016 for additional canal lining work. NEPA and contract considerations are underway. This is an extremely important success for GVWUA for several reasons. It will allow GVWUA to keep canal flows at high rates for longer periods of time at Indian Wash without seep related damages in the Palisade area. It will also help in making full use of the GVP's irrigation water right, which is a fundamental part of firming up pre-Colorado River Compact water rights.

4. GVWUA has been granted matching funds from the Colorado Water Conservation Board to conduct the **Roller Dam and Related Facilities Master Plan**. The number one priority in this plan, which is currently under development, is the **Canyon Canal Improvement Project**.

5. When taken together with the planned $5.2 million rehabilitation of **Grand Valley Power Plant**, operated by GVWUA and OMID under a Reclamation LOPP, scheduled to begin in the fall of 2017, this system of interrelated water facilities is of extremely high importance to Reclamation's Grand Valley Project and the attendant senior water rights, support of the Upper Colorado Endangered Fish Recovery Program, the administration of the Colorado River now and in the future, and all those beneficiaries thereof.

6. Various efforts are ongoing in both the Upper and Lower Basins of the Colorado River to implement **system conservation and demand management measures** in order to reduce consumptive use and increase

the amount of water stored in Lakes Powell and Mead. Reclamation is directly involved in many of these efforts. These efforts could include rotational fallowing of irrigated lands in the Grand Valley or other methods of reducing consumptive use and various system improvements that potentially make water sharing more feasible. However, in order for this to provide the intended benefits, there must be some means to ensure that the saved consumptive use is delivered to and past the Grand Valley and not diverted by other water users upstream. The decree in the Orchard Mesa Check Case allows for a unique protective mechanism for reduced irrigation demand by using the power right for the GVPP, as explained in response to Criterion D (see Section 1.4.4.1). However, it is important that the Canyon Canal Improvement Project be completed so that the Canyon Canal can accommodate such increased use.

Reducing hydraulic capacity limitations in the Canyon Canal by competing the Canyon Canal Improvement Project is a necessary requirement to enable these innovative ideas that involve multiple beneficiaries, including Reclamation and the Endangered Fish Recovery Program.

## 1.5 Performance Measures

The following performance measures are proposed in support of the benefits of the implementation of this Project. Only those measures that apply to this Project are discussed.

### 1.5.1 Performance Measure No. A: Projects with Quantifiable Water Savings

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

This Project entails the lining of 500 feet of existing earthen/cobble canal. This lining effort will result in the reduction and/or elimination of seepage and salt loading occurring from the existing, open, aging unlined canal section. GVWUA proposes to document the benefits of lining this section of the canal by comparing the existing water measurements at the USGS gage downstream of the fish screen to those realized after the construction of the Project. The measurements will document the 100 cfs delivery through the top 500 feet of the canal.

- Pre-Project: flows are currently being measured at an USGS gage just downstream of the fish screen.
- Post-Project: flows will continue to be measured and documented after the construction of this project, measuring the delivery of the 100 cfs through the top 500 feet of the canal.

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

See Section 0 for detailed information regarding the benefit of this Project to benefit the endangered fish species.

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

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

The water marketing potential within the Project area is being discussed as part of ongoing water banking discussions. There are some legal issues pertaining to the water market potential and are being discussed with Reclamation and other groups representing the State water laws have been actively engaged. This Project could provide the mechanism to support crop shifting or idling; however it is unknown at this time, how this will and can be measured. See Section 1.4.3 for more information about the Water Marketing potential.

## 2.0 Environmental and Cultural Resources Compliance

This section addresses the potential impacts to environmental and cultural resources based upon the status of the Project to date. The cultural resources assessment is the only resource that has been investigated more thoroughly. GVWUA understands that under no circumstances will any ground-disturbing activities (including staging, grading, clearing, and other preliminary activities) occur on this Project prior to completing the required environmental compliance and receiving the work to proceed from Reclamation.

Overall, this project benefits the environmental and cultural resources, in addition to the administration of the Colorado River in the following ways:

- Complying with obligations to those that receive water from the Roller Dam. The Irrigation Districts and the GVPP and with the obligations of the Orchard Mesa Check case which also benefits Grand Valley Irrigation Company.
- Allows GVWUA to better maintain adequate flows in the 15 Mile Reach to aid in the Colorado River Endangered Fish Recovery Program.
- Provides for consistent and uniform delivery of water throughout the 50 mile valley delivery system.
- Contractual obligations of GVWUA to Reclamation for adequate maintenance and operation.
- Reduces Compact issues by supporting a sustainable balance between Lake Powell and Lake Mead.
- Helps implement provisions of the Colorado River Cooperative Agreement and benefits all of the signers of that Agreement.
- Staying above the power generation level in Powell benefits not just irrigation users, but nearly all power users in the West.
- Colorado River recreation opportunities are supported by irrigation water moving down the Valley and beyond.
- Wildlife habitat is improved by the ability to conserve water at the Dam and in the River.
- Effective and efficient irrigation water systems support economic and civic development throughout the Valley.

GVWUA has already begun coordinating with the Western Area Office staff regarding the potential Environmental Assessment (EA) document for this Project. The information below is based upon the best available data to date, the IPaC Trust Resource Report and a Class III Cultural Inventory.

The IPaC Trust Resource Report is for informational purposes only. It is understood that any potential impacts will need to be investigated further and U.S. Fish and Wildlife Service review or concurrence may be necessary.

*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.*

Impacts will be those associated with reshaping the canal prism and lining the canal. Trenching will also occur to bury the existing overhead power lines. The proposed project improvements will occur entirely within the existing canal prism. The proposed area of work for the project has an established access road which will allow work within the Roller Dam and Canyon Canal lands. Any surface vegetation that will occur will be revegetated. The appropriate dust control measures will be implemented to avoid any air quality concerns.

*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?*

According to the IPaC Trust Resource Report and the general working knowledge of the surroundings of the Project the following threatened species could be within the Project area:

- Mexican Spotted Owl
- Yellow-billed Cuckoo
- Greenback Cutthroat Trout
- Debeque Phacelia

The four endangered fish within the Project area have been discussed in detail throughout this grant application and listed in Table 5. Endangered Fish in the 15 Mile Reach.Since the majority of the project work is going to occur within the existing footprint of the canal these threatened and endangered species should not be affected.

There are no critical habitats in the Project area.

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

According to the IPaC Trust Resource Report the Project area could overlap with a "Freshwater Forested/shrub Wetland" or a "Riverine" wetland. Since the majority of the project work is going to occur within the existing footprint of the canal these wetland types should not be encountered.

*4. When was the water delivery system constructed?*

This section of canal was constructed between 1913 and 1915.

*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.*

This Project will reshape the canal prism and install a liner as discussed throughout this grant application and more specifically in the technical project description Section 1.3.

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

Alpine Ecological Consultants, Inc. conducted an intensive inventory of historic properties in the Project area and developed a Class III Cultural Resource Inventory in November 2015. The results of the inventory are summarized in Section 2.1. A copy of the *Determination of Eligibility and Effect, Government Highline Canal Top 500' Lining Project, Grand Valley Project, Mesa County, Colorado* letter from Mr. Ed Warner, Reclamation, Upper Colorado Region, Western Colorado Area Office, Area Manager, was submitted to Mr. Steve Turner, State Historic Preservation Officer of the Colorado Office of Archaeology and Historic Preservation. The Reclamation proposes a finding of adverse effect, and recommends preparing a Level II archival documentation package that focuses on the Government Highline Canal and the decorative wall barrier along the canal. Reclamation also recommends that the footing and construction of the top 58 feet of the decorative barrier wall be examined and repaired to ensure its preservation with in-kind materials which are blended with its current visible state. The letter is available upon request.

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

There are no known archeological sites in the proposed Project area.

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

No. The project would not require a right-of-way or relocations from adjacent properties and would have no impact on residential properties or uses within the Project area.

*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?*

There are no known existing noxious weeds or non-native invasive species within the Project area, therefore the project will not contribute to the introduction of these species.

## 2.1 Cultural Assessment

The results from a Class III project inventory conducted by Alpine Ecological Consultants, Inc. (2015) resulted in additional documentation to two linear sites and the rerecording of four, temporally associated structures that are now consolidated under one Smithsonian site number. Figure 11 depicts the locations of the recorded sites and site forms are included in the Alpine Ecological Class III Cultural Resource Inventory. This report is available upon request.

The cultural resources inventory for the Government Highline relining project was undertaken on three project areas along the canal that will be used as staging areas. The project was completed on Reclamation lands managed by GVWUA. A total of 5.7 acres were inventoried during the project. The project inventory resulted in an expansion of the 2011 recordings of the Government Highline canal and the RGJ/D&RGW Railroad. It also resulted in combining individual structures recorded as sites 5ME12482–5ME12485 into one collective recording under site number 5ME12482. A summary of the recorded sites is presented in Table 7 along with each site's management recommendations.

**Table 7. Summary of Sites within the Project Area.**

| Site No. | Site Type | NRHP Eligibility Determination | Management Recommendation |
|---|---|---|---|
| 5ME4676.24 | Government Highline Canal | Officially Eligible | Avoid or mitigate |
| 5ME7351.21 | RGJ/D&RGW Railroad | Field Eligible | Avoid |
| 5ME12482 | CCC structures and work complex | Field Eligible | Avoid |

A low prehistoric site density was expected, given the heavily disturbed nature of the project area from past activity associated with the Grand Valley Project. Based on

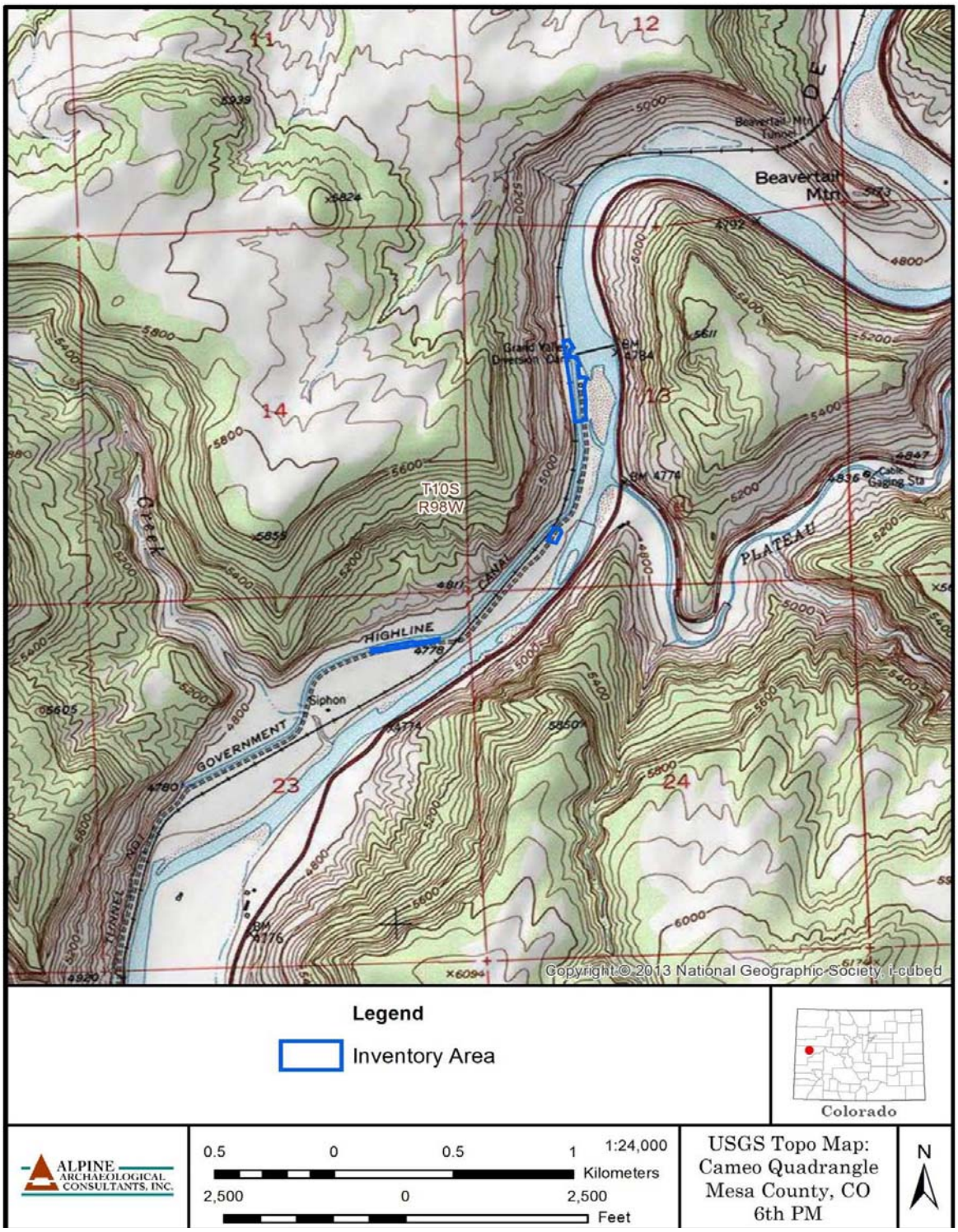


**Figure 11. Cultural Resources Inventory Areas (Alpine Ecological Consultants, Inc., 2015).**

the number of buildings depicted on the 1914 U.S. Reclamation map for the diversion dam, it was expected that elements of these structures might still be present on the western side of the Government Highline Canal. This was not the case, as this area has been heavily impacted by the construction of the canal and the railroad. The purpose of the inventory was to identify cultural resources within the project area, evaluate their NRHP eligibility, assess potential project impacts, and to make recommendations to avoid or mitigate these impacts. These objectives have been achieved.

## 3.0 Required Permits or Approvals

This section identifies the existing and expected agreements, easements, and permits for this project. Note some of this information is subject to change pending the EA process and cultural findings discussed in Section 2.0.

### 3.1 Existing Agreements

- Lease of Power Privilege – GVWUA worked directly with Reclamation to obtain a LOPP and Funding Agreement from Reclamation
- Several Reclamation operation agreements

### 3.2 Permits and Approvals

- Environmental Assessment

The Reclamation and GVWUA have developed a pending Memo of Understanding (MOU) detailing the identified environmental and regulatory compliance requirements. Due to the cultural sensitivities of the canal facilities additional cultural assessments may be required. Post July 1, 2015, a cultural assessment has begun to address the culturally sensitive areas with further cultural assessment work expected as the project nears final design and construction.

Depending on final design of the canal the Reclamation identified potential mitigation efforts may be required on the historically significant features. Permitting with U.S. Army Corp of Engineers as well as habitat assessments remain as potential environmental components of the project.

- State of Colorado via Mesa County Building Permit for Electrical

GVWUA is going to trench the overhead powerline as part of this project and will need to coordinate with Mesa County Building Department and the State of Colorado Electrical inspector as part of this activity.

## 4.0 Official Resolution

GVWUA's Board of Directors (BOD) is the governing body that authorizes the legal and financial obligations and commitments of its organization. GVWUA BOD unanimously supported this application and committed to the funding contributions specified in the Funding Plan (see Section 6.0) at the January 2016 GVWUA Board

# Appendix A

## Letters of Support

**Palisade Irrigation District**
**Colorado River Water Conservation District**
**The Nature Conservancy**

PALISADE
IRRIGATION DISTRICT

777 35 3/10 Road, Palisade, CO 81526
970-464-4700 / Fax 970-464-1337

January 11, 2016

Bureau of Reclamation
Attn: Ms. Janeen Koza
Mail Code: 84-27852
P.O. Box 25007
Denver, Colorado 80225

Dear Ms. Koza,

The Palisade Irrigation District is pleased to voice our support of the Grand Valley Water Users Association's (GVWUA) and Orchard Mesa Irrigation District's (OMID) application to the WaterSMART: Water and Energy Efficiency Grants for FY 2016 for the Government Highline Canal (Canyon Canal) Top 500 Feet Relining Project in Mesa County, Colorado. The Canyon Canal supplies water to our District and this project will help improve the reliability of our junior water right by improving the hydraulic efficiency of the top 500 feet of the Canyon Canal. Palisade Irrigation District has engaged in significant project planning and stakeholder involvement in support of the project.

This project will allow other downstream water users within the Grand Valley Project and the Upper Colorado Basin the opportunity to fulfill the commitment to the Colorado River Cooperative Agreement (CRCA). Our District supports the GVWUA and OMID in their dedication to improve water use efficiency on the Colorado River.

Sincerely,

/Dan Crabtree/, Superintendent
Palisade Irrigation District

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Colorado River District
Protecting Western Colorado Water Since 1937

January 13, 2016

Bureau of Reclamation
Attn: Ms. Janeen Koza
Mail Code: 84-27852
P.O. Box 25007
Denver, Colorado 80225

Dear Ms. Koza:

On behalf of the Colorado River Water Conservation District (River District), I am pleased to write in support of Grand Valley Water Users Association's (GVWUA) and Orchard Mesa Irrigation District's (OMID) application to the WaterSMART: Water and Energy Efficiency Grants for FY 2016 for the Government Highline Canal (Canyon Canal) Top 500 Feet Relining Project in Mesa County, Colorado. This project will allow the GVWUA and OMID to improve the hydraulic efficiency of the top 500 feet of the Canyon Canal by installing a new PVC liner and a shotcrete wear surface, potentially resulting in the accommodation of at least 100 cubic feet per second (cfs) more of the legal water rights adjudicated for this structure, ultimately increasing the diversion ability and efficiency during times of river flow below 2,250 cfs. Significant project planning and stakeholder involvement has been conducted to date including design work and NEPA related coordination with the Bureau of Reclamation (BOR).

This project will help inform the BOR and allow downstream water users within the Grand Valley Project and within the Upper Colorado Basin the opportunity to fulfill the commitment to the Colorado River Cooperative Agreement (CRCA) as well as its agreements with the BOR. The River District supports the GVWUA and OMID in their dedication to address the water needs of our area.

Sincerely,

Daniel R. Birch, P.E.
Deputy General Manager

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The Nature Conservancy
Colorado River Program
2424 Spruce St.
Boulder, CO 80302

nature.org/coloradoriver

January 16, 2016

Bureau of Reclamation
Attn: Ms. Janeen Koza
Mail Code: 84-27852
P.O. Box 25007
Denver, Colorado 80225

Dear Ms. Koza,

The Nature Conservancy is pleased to write in support of Grand Valley Water Users Association's (GVWUA) and Orchard Mesa Irrigation District's (OMID) application to the WaterSMART: Water and Energy Efficiency Grants for FY 2016 for the Government Highline Canal (Canyon Canal) Top 500 Feet Relining Project in Mesa County, Colorado.

Modernizing how agricultural water is used and managed is an important goal of the Conservancy's work in the Colorado River Basin, and this project will allow the GVWUA and OMID to significantly improve their system. Furthermore, the Conservancy has been engaged with GVWUA and OMID in a multi-stakeholder planning process that has identified and prioritized repairs and improvements to the Government Highline Canal.

Continued improvements to the Government Highline Canal support efforts to maintain and improve river flows in the 15-mile reach, a critical stretch of river for the endangered fish species. This project will also help inform the BOR and allow downstream water users within the Grand Valley Project and within the Upper Colorado Basin the opportunity to fulfill the commitment to the Colorado River Cooperative Agreement (CRCA) as well as its agreements with the BOR. The Conservancy is committed to working in partnership to meet the water needs of both people and nature and fully supports the GVWUA and OMID in their dedication to address the water needs of the area.

Sincerely,

Taylor Hawes
Director, Colorado River Program