Draft
Environmental Impact Statement

Green River Diversion Rehabilitation Project

Emery and Grand Counties, Utah

Sponsoring
Local Organization:

Prepared For:

Cooperating Agency:

Prepared By: McMillen, LLC

March 2014

Title and Document Status: Draft Environmental Impact Statement (DEIS) for the Rehabilitation of the Green River Diversion

Lead Agency: U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)

Cooperating Agency: U.S. Department of the Interior Bureau of Land Management (BLM)

Sponsor/Local Organization: Utah Department of Agriculture and Food (UDAF)

Authority: This DEIS has been prepared under the authority of the Emergency Watershed Protection (EWP) program (7 CFR Part 624) and in accordance with Section 102(2)(c) of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-190, as amended (42 U.S.C. 4321 et seq.).

Abstract: The Green River/Tusher Diversion was constructed in the early 1900s and has been modified over the years to maintain the structure. During the 2010/2011 flood events, flows in the Green River caused severe damage to the diversion structure, compromising its structural integrity. In the event of diversion failure, water service to three irrigation canals, the City of Green River, a historic irrigation water delivery system, and one hydropower plant would be eliminated. Rehabilitating the diversion would directly result in these resources remaining usable for the water rights holders. The NRCS and UDAF have analyzed alternatives to maintain the existing functions of the diversion for water delivery to irrigation canals and upgrade the diversion structure to current design standards, as well as provide upstream and downstream fish passage and tracking, fish screening, enhanced sediment sluicing, and downstream recreational boat passage. The fish protection and passage components are proposed for inclusion in the project to meet Endangered Species Act requirements for listed fish species populations in the Green River. The boat passage provision is a navigability requirement of the state of Utah.

Comments: NRCS has completed this DEIS in accordance with the NEPA and NRCS guidelines and standards. Reviewers should provide their comments to McMillen, LLC during the allotted public review period, which is March 14, 2014 – April 30, 2014. Comments should be sent to McMillen, LLC by Wednesday, April 30, 2014. Please send comments to:

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ACRONYMS AND ABBREVIATIONS

ac-ft	acre-feet
ACHP	Advisory Council for Historic Preservation
AGFD	Arizona Game and Fish Department
APE	Area of Potential Effect
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOR	Bureau of Reclamation
CBD	Center for Biological Diversity
CCS	Center for Climate Strategies
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
cm	centimeter
CWA	Clean Water Act
DAQ	Division of Air Quality
DCH	Designated Critical Habitat
Draft EA	Draft Environmental Assessment
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
EWP program	Emergency Watershed Protection Program
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FFSL	Forestry, Fire and State Lands (Utah Division of)
FR	Federal Register
GHG	greenhouse gas
GRCC	Green River Canal Company
HTRW	hazardous, toxic, and radioactive waste
kg	kilogram
LUC	Land Use Code
LUHNA	Land Use History of North America
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
MOA	Memorandum of Agreement
MSAT	Mobile Air Source Toxics
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act

NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	nitrous oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	ozone
OHV	off-highway vehicle
Pb	lead
PFO	palustrine forested
PIT	passive integrated transponder
PM	particulate matter
PSS	palustrine scrub-shrub
RM	River Mile
ROD	Record of Decision
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SEUTP	Southeast Utah Tamarisk Partnership
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
SWPPP	Storm Water Pollution Prevention Plan
T&E	threatened and endangered
TMDL	total maximum daily load
UAC	Utah Administrative Code
UACD	Utah Association of Conservation Districts
UCDC	Utah Conservation Data Center
UDAF	Utah Department of Agriculture and Food
UDEQ	Utah Department of Environmental Quality
UDEQ-DWQ	Utah Department of Environmental Quality - Division of Water Quality
UDNR	Utah Department of Natural Resources
UDWRe	Utah Division of Water Resources
UDWRi	Utah Division of Water Rights
UDWR	Utah Division of Wildlife Resources
UGS	Utah Geological Survey
UPDES	Utah Pollutant Discharge Elimination System
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWCA	Utah Weed Control Association
UWRL	Utah Water Research Laboratory
VOC	volatile organic compound

CHAPTER S. Summary

S.1. Background of the Project

Flooding in 2011 heightened concerns that a catastrophic failure of the diversion could result in significant losses to the local agricultural economy. The effects of recent flooding include cracking and chipping of concrete, undercutting of the downstream foundation sediments, and cracks associated with structural failure. This damage prompted the Green River Conservation District and, subsequently, the Utah Department of Agriculture and Food (UDAF) to move forward with plans to rehabilitate the existing Green River Diversion, also known as the Tusher Diversion.

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) is working with UDAF through the Emergency Watershed Protection (EWP) Program to rehabilitate the existing Green River Diversion (diversion) system that will continue to provide water delivery to water rights holders.

Agency and stakeholder participation, along with public involvement, are key components that lead the NEPA process. Project information was made available to the public during the first scoping period from October 30, 2012 to November 30, 2012. A public scoping meeting was held on November 15, 2012 at the Green River City Hall. Numerous meetings with agency officials and stakeholders occurred during that time period. Based on the results of these scoping efforts, an Environmental Assessment (EA) was determined to be the correct course of action for the project.

Consultation with the Utah State Historic Preservation Office (SHPO) resulted in a determination that the diversion is historic and may be eligible for listing on the National Register of Historic Places (NRHP). Consequently, any modifications to the diversion may result in an adverse effect to the historic resource. This study has included a wide range of alternatives (as detailed in Chapter 3, Alternatives), some of which would result in impacts to the diversion considered “significant” to cultural resources.

Due to the potential for a significant resource impact, NRCS decided to prepare an EIS for the project instead of an EA. The Notice of Intent (NOI) to prepare an EIS was published, and a second scoping period was opened from May 29, 2013 to July 2, 2013.

This Draft EIS is available for public comment on March 14, 2014 through April 30, 2014. A public meeting will be held in Green River, Utah on April 10, 2014. All comments received during the comment period will be addressed in the Final EIS.

S.1.2 Changes from the Draft EIS

This section will include all changes that are made to this document upon the issuance of the Final EIS.

S.2. Purpose and Need

S.2.1. Purpose of the Proposed Action

The purpose of the proposed action is to rehabilitate the existing Green River Diversion. The project would rehabilitate the diversion due to damage caused by past flood events, upgrade the diversion infrastructure to current design standards, maintain the level of water delivery to the existing water rights holders, and comply with applicable Federal rules and regulations.

S.2.2. Need for the Proposed Action

The need for the project is to maintain existing functions of the diversion for water delivery to water rights holders (irrigation canals and the powerhouse).

S.3. Proposed Action

The Proposed Action would rehabilitate the Green River Diversion, which is necessary due to damage caused by past flood events; upgrade the diversion infrastructure to current design standards; maintain the level of water delivery to the existing water rights holders; and, comply with applicable Federal rules and regulations. The Proposed Action would maintain existing functions of the diversion for water delivery to water rights holders, thereby meeting the Project Purpose and Need.

Based on the screening of the range of alternatives that accounted for water right delivery, engineering practicability, environmental impacts, and public and participating agency input, the Proposed Action is recommended (the "preferred alternative" would likely be a combination of the components, and would be decided upon in the Final EIS). The Proposed Action is a list of alternative components that were favored by the public, cooperating and participating agencies.

- Replace existing diversion structure.
- Raise the structure 1 foot for water delivery to irrigation systems and provide sufficient water for bypass flows at fish protection systems
- Move sediment through the system and maintain floodwater conveyance.
- Replace existing gate and bridge at west raceway and provide sufficient water for bypass flows at fish protection systems.
- Improve east side raceway to water wheel.
- Dredge the large deposition area at the mouth of Tusher Wash for a source of cobble and gravel during construction.
- Construct a new siphon intake at the east side canal.
- Install deflection log booms at the east and west ends for public safety and structure protection.

- Reinforce the diversion structure with riprap.
- Provide upstream fish passage past diversion structure.
- Provide downstream fish passage via notches in the diversion structure.
- Provide passive integrated transponder (PIT) tag detectors to sense and record fish movement over and around the diversion.
- Install fish screen and bypass at the east side canal.
- Provide both dry and wet downstream boat passage past the diversion structure.
- Install boater warning signs upstream of the diversion for public safety.

S.4. Summary of Alternatives Analysis

The process of formulating alternatives for rehabilitation of the diversion followed procedures outlined in the NRCS National Environmental Compliance Handbook (USDA NRCS 2011). Numerous alternatives were developed by the project team based on the ability to address the purpose and need of the project. Some of the initial alternatives were eliminated from further analysis due to high cost or other critical factors. The project team developed a series of questions and filters to help formulate alternatives:

- *Initial Screening Question:* - Does the concept/alternative meet purpose and need?

  Several alternatives were eliminated from further study upon the application of the initial screening question. A baseline alternative was developed at this stage of the process to demonstrate rehabilitation of the diversion.

- *Secondary Post-Scoping Screening Filters:*

  -Is it consistent with established design criteria, engineering practices, etc.?

  -Is it reasonable and feasible, and within the established NRCS EWP scope of work?

S.4.1. No Action Alternative

The No Action Alternative would consist of using no Federal money to rehabilitate the Green River Diversion. Due to the cost associated with the rehabilitation of the diversion, it is likely that no repairs would be made by the stakeholders to the severely damaged structure; it would not be upgraded to current engineering standards and technology, and would provide very limited fish passage and no boat passage. The sediment control/sluice gates would also remain in their current condition. This alternative, therefore, represents the scenario in which the diversion may likely fail during an extreme flood event in the future.

S.4.2. Replace In Place Alternative

This baseline alternative would replace the diversion at the same location or within close proximity to the existing diversion. The diversion structure or "weir" length would remain the same as the existing. The rehabilitate alternative would maintain the existing east side and west side tie-in locations to the bank, where feasible. The alternative would upgrade the structure to current engineering standards and technology. The 750-foot, arc-shaped crest of the weir would be 1 foot higher and would raise the water surface elevation 1 foot; which would ensure delivery to water users. This alternative would include one new gate for water control and sluicing; and a new bulkhead gate structure and 80-foot raceway to the water wheel on the east side at the Hastings Ranch to maintain existing water rights. As part of the diversion rehabilitation, all water rights would be maintained.

On the west side of the diversion, the Green River Canal and powerhouse raceway would be controlled by the existing gate bridge/structure. To reduce debris collection and as a safety measure, two deflection log booms would be positioned across the raceway entrance. The 100-foot long west side and 170-foot long east side log booms would tie into a sluice gate in order to pass the debris past the weir and avoid blockages. At the east side, a new siphon intake for the East Side Canal would be constructed.

Downstream fish passage across the diversion would not be provided by this alternative. Upstream fish passage would be the same as existing passage on the east side of the structure.

The diversion structure itself would be designed for safe passage over the diversion by boats during passable flows by creating a gradual slope that does not form an eddy that could trap boaters underwater. Boater warning signs would be placed at locations above the diversion on both banks.

This alternative would also require the temporary use of approximately 5.5 acres of BLM-managed public lands, 14.5 acres of state sovereign lands (Green River itself), and 2.3 acres of private lands for staging and access during construction.

S.4.3. Replace In Place With Passages Alternative

This alternative would demolish the existing diversion and install a new diversion in the same location. This alternative would replace the existing diversion along the current alignment and upgrade the structure to current engineering standards and technology. Replacing the existing structure would maintain the historic setting of the project site. The 750-foot, arc-shaped crest of the weir would be 1 foot higher and would raise the water surface elevation 1 foot; which would ensure delivery to water users. This alternative would include two new gates for water control and sluicing; and a new bulkhead gate structure and 80-foot raceway to the water wheel on the east side at the Hastings Ranch to maintain existing water rights. As part of the diversion rehabilitation, all water rights would be maintained.

On the west side of the diversion, the existing gate structure would be replaced to provide more efficient water control and sluicing capabilities for the Green River Canal and powerhouse raceway. To reduce

debris collection and as a safety measure, two deflection log booms would be positioned across the raceway entrance. The 100-foot long west side and 170-foot long east side log booms would tie into a sluice gate in order to pass the debris over the weir and avoid blockages. At the east side, a new siphon intake for the East Side Canal would be constructed.

Downstream fish passage across the diversion would be provided along the length via notches in the structure. Adjacent to the water wheel raceway would be an upstream fish passage channel (10 feet wide and approximately 180 feet in length) that would be designed to accommodate fish during low flows. Passive integrated transponder (PIT) tag detectors would be placed at each downstream fish passage notch and at the entrance/exit of the upstream fish passage to sense and record fish movement over and around the diversion. A fish screen would be placed in the East Side Canal near the river, with passage back to the river. All concentrated fish passage areas would have PIT tag detectors to estimate population movement and numbers.

Boat passage components would provide additional debris removal benefits. This notch in the diversion structure could be located either in the center of the diversion or adjacent to the upstream fish passage and the water wheel raceway on the east side (refer to Appendix D for supporting documentation regarding the proposed locations of the boat passage). The boat passage section would consist of a stepped opening 30-feet wide by 2-feet deep in the diversion with a more gradual slope into the tailwater of the diversion to provide safer rafting over the diversion. The boat passage would be lined with concrete and flows could be regulated using a weir at the entrance. The diversion structure itself would be designed for safe passage over the dam during passable flows by creating a gradual slope that does not form an eddy that could trap boaters underwater. Boater warning signs would be placed at locations above the diversion on both banks.

This alternative includes the use of cobbles and gravel that have been deposited into the river channel below the diversion and at the confluence of Tusher Wash. This alternative would also require the temporary use of approximately 5.5 acres of BLM-managed public lands, 14.5 acres of state sovereign lands (Green River itself), and 2.3 acres of private lands for staging and access during construction.

S.5. Affected Environment

The *project area and/or vicinity* is defined as the area within approximately ½ mile to one mile of the Green River Diversion, including the private properties adjacent. The *study area* is much larger, typically county-wide.

Soils

- Soils in the study area have been mostly derived from the Mancos Shale. In the study area portion of Grand County, two soil types are prevalent, including the Redbank-Flatnose families association, and the Toddler-Ravola-Glenton families association. Emery County soils in the area include Beebe loamy fine sand, Ferron-Green River-Rafael complex, Garley-Ravola-Huntsman complex, Hunting loam, strongly saline, Penner loam, and Vickel-Utaline-Persayo complex. The dominant soils within the study area are characteristic of river valleys and floodplains and occur at elevations comparable to the diversion and surrounding area. There are minor amounts of

prime farmland (if irrigated) and locally important farmland in the study area. Irrigated crop production in the study area is dominated by melons.

Water

- Water resources in the study area include the Green River, Tusher Wash, the Green River Canal, the Thayne Canal, the East Side Canal, and wetlands. Floodplains in the study area include those of the Green River in Grand County (Emery County is unmapped).

Air

- The project is located within an air quality attainment area.

Plants and Animals

- Habitat in the study area includes riparian along the river. The river supports common native and non-native fish species. Terrestrial habitats support wildlife that uses riparian areas and agricultural land.
- Four federally-listed fish species are known to use the project area: Bonytail (*Gila elegans*), Colorado pikeminnow (*Ptycholcheilus lucius*), Humpback chub (*Gila cypha*), and Razorback sucker (*Xyrauchen texanus*). Portions of the Green and Colorado rivers in Utah are designated as critical habitat for all four endangered fish species in the study area; consultation has verified that the study area is designated critical habitat for the razorback sucker and the Colorado pikeminnow.
- Several other special-status species (species that are ESA candidates, identified by the State or BLM as sensitive or part of conservation agreements) could be present in the study area. Of these, only Yellow-billed cuckoo (*Coccyzus americanus*) may be present in the project area.

Humans

- **Socioeconomics, including Environmental Justice:** Compared to other areas of the nation and state, the study area has a higher-than-average unemployment in 2010 and a lower-than-average median income. In 2009, the market value of irrigated crops produced in Emery County was $86.89 per acre, and in Grand County was $301.52 per acre. There are potential environmental justice populations concentrated in the study area.
- **Cultural Resources:** The diversion and the East Side Canal are eligible for listing on the National Register of Historic Places (NRHP), along with several other sites and structures. The project would have a significant adverse effect on the diversion and the East Side Canal. A treatment plan and Memorandum of Agreement (MOA) are currently in development.
- **Recreation:** The study area is located between Swasey's Beach and Boat Ramp to the north and Green River State Park to the south, both of which are camping and trail access areas. The BLM-managed lands west of the project are used for recreation access and OHV use. There is unauthorized use of canals and canal maintenance roads for recreation.
- **Scenic beauty and Visual Resources:** Landforms, buildings, water, and vegetation contribute to the overall scenic quality of the study area. The visual quality and landscape of the area is rural/agricultural.

S.6. Environmental Consequences of the Proposed Action

In summary, the project alternatives propose to adversely or beneficially effect the following resources:

- Water Resources
- Socioeconomics
- Cultural Resources
- Vegetation
- Threatened and Endangered Species
- Recreation

Table S-1 provides a comparison of impacts associated with each alternative, as well as recommended mitigation.

Table S-1. Summary and Comparison of Direct, Indirect, and Short-Term Resource Impacts

Effects	No Action	Replace In Place (Baseline)	Replace In Place With Passages
Soils	*Direct Impacts*: None *Indirect* effect - scouring of soil downstream from diversion failure. Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: Approx 1100 cubic yards of cobble and gravel removed from the Tusher Wash deposition area and used to construct and/or support the diversion *Short-Term*: Potential soil disturbance and sediment into Green River during construction. Temporary disturbance to access roads and staging areas during construction.	*Direct Impacts*: Approx 1100 cubic yards of cobble and gravel removed from the Tusher Wash deposition area and used to construct and/or support the diversion *Short-Term*: Potential soil disturbance and sediment into Green River during construction. Temporary disturbance to access roads and staging areas during construction.
Prime and Unique Farmlands	*Direct Impacts*: None *Indirect and/or Short-Term*: Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: None *Short-Term*: Temporary easement for access during const.	*Direct Impacts*: None *Short-Term*: Temporary easement for access during const.
Water Resources – Water Quality, Hydrology, Floodplains	*Direct Impacts*: None *Short-Term*: Construction activities would temporarily affect sediment levels in river channel.	*Direct Impacts*: None. *Short-Term*: Temp disturbance to river channel.	*Direct Impacts*: None *Short-Term*: Temp disturbance to river channel.
Waters of US including Wetlands	*Direct Impacts*: None *Indirect* effects to streams. Stream channel altered and wetlands washed away or filled with sediment from diversion failure.	*Direct Impacts*: 1.4 ac impact to open waters. *Short-Term*: 14.5 ac temporary impact to open waters; 0.34 ac temporary impact to wetlands.	*Direct Impacts*: 1.4 ac impact to open waters. *Short-Term*: 14.5 ac temporary impact to open waters; 0.34 ac temporary impact to wetlands.
Climate Change	*Direct Impacts*: None	*Direct Impacts*: None	*Direct Impacts*: None
Air Quality	*Direct Impacts*: None *Indirect and Short-Term*: None	*Direct Impacts*: None *Short-Term*: Construction activities would temporarily affect air quality in the project area.	*Direct Impacts*: None *Short-Term*: Construction activities would temporarily affect air quality in the project area.

Effects	No Action	Replace In Place (Baseline)	Replace In Place With Passages
Plants – Riparian Zone and Other	*Direct Impacts*: None *Short-Term*: Damage to vegetation downstream of diversion from failure.	*Direct Impacts*: 0.5 ac of impact *Short-Term*: Potential for additional impact in access and staging areas during construction.	*Direct Impacts*: 0.5 ac of impact *Short-Term*: Potential for additional impact in access and staging areas during construction.
Threatened and Endangered Species	*Direct Impacts*: Obstructed fish passage during low flows. *Short-Term*: Damage to species and habitat downstream of diversion from failure.	*Direct Impacts*: 1.4 acres of impact due to new riprap in channel; No downstream fish passage. Obstructed fish passage during low flows. No fish or wildlife kills anticipated. *Short-Term*: 14.5 ac of disturbance to the channel during construction (designated critical habitat).	*Direct Impacts*: 1.4 ac of impact due to new riprap in channel; no fish or wildlife kills anticipated. Enhancement of passages and installation of monitoring tools for improvement of habitat. *Short-Term*: 14.5 ac of disturbance to the channel during construction (designated critical habitat).
Fish	*Direct Impacts*: Obstructed fish passage during low flows. *Short-Term*: Possible destruction or modification of fish habitat in the channel downstream.	*Direct Impacts*: 1.4 acres of impact due to new riprap in channel; Obstructed fish passage during low flows. *Short-Term*: 14.5 ac of disturbance to the channel during construction	*Direct Impacts*: 1.4 acres of impact due to new riprap in channel; *Short-Term*: 14.5 ac of disturbance to the channel during construction
Wildlife	*Direct Impacts*: None *Short-Term*: Injury or fatality, as well as extreme habitat modifications, in the inundation area from diversion failure.	*Direct Impacts*: 0.5 acres of wildlife habitat impacted (riparian) *Short-Term*: Temp disturbance to project area	*Direct Impacts*: 0.5 acres of wildlife habitat impacted (riparian) *Short-Term*: Temp disturbance to project area
Socioeconomics	*Direct Impacts*: None *Indirect and/or Short-Term*: Adverse effects damage to roads, access and property damages; loss of crops and jobs during floods. Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: None *Short-Term*: Job creation during construction.	*Direct Impacts*: None. *Indirect*: Possible increase in tourism, economy in the vicinity due to provision of boat passage. *Short-Term*: Job creation during construction.

Effects	No Action	Replace In Place (Baseline)	Replace In Place With Passages
Cultural/Historic	*Direct Impacts*: None *Indirect and/or Short-Term*: historic diversion structure would be adversely affected.	*Direct Impacts*: Structure demolition and E Side Canal improvements a significant adverse effect. *Short-Term*: Construction activities, staging of equipment and materials, and river access temp impacts to eligible sites. Mitigate adverse effects through the development of a treatment plan that would become formalized in a Memorandum of Agreement (MOA).	*Direct Impacts*: Structure demolition and E Side Canal improvements a significant effect. *Short-Term*: Construction activities, staging of equipment and materials, and river access temp impacts to eligible sites. Mitigate adverse effects through the development of a treatment plan that would become formalized in a Memorandum of Agreement (MOA).
Recreation/Public Health & Safety	*Direct Impacts*: None *Indirect and/or Short-Term*: High hazard and loss-of-life potential in the event of diversion failure.	*Direct Impacts*: None *Indirect and/or Short-Term*: Reduction of loss-of-life potential.	*Direct Impacts*: Enhanced recreation opportunities for the boating community due to provision for boat passage. *Indirect and/or Short-Term*: Reduction of loss-of-life potential.
Visual Quality/ Aesthetics/Scenic Beauty	*Direct Impacts*: None *Indirect and/or Short-Term*: Construction site would degrade the area temporarily.	*Direct Impacts*: None *Indirect and/or Short-Term*: Construction site would degrade the area temporarily.	*Direct Impacts*: None *Indirect and/or Short-Term*: Construction site would degrade the area temporarily.
Land Use/Rights	*Direct Impacts*: None *Short Term*: Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: None *Short-Term*: Temporary easement (approx.5.5 ac.) for BLM access during const. Special Use Lease (State of Utah) – 14.5 ac (temp. construction); 1.4 ac permanent easement.	*Direct Impacts*: None *Short-Term*: Temporary easement (approx.5.5 ac.) for BLM access during const. Special Use Lease (State of Utah) – 14.5 ac (temp. construction); 1.4 ac permanent easement.
Infrastructure - Transportation	*Direct Impacts*: None *Indirect and/or Short-Term*: Adverse effects from damage to roads from a diversion failure. Loss of access during floods.	*Direct Impacts*: None *Indirect and/or Short-Term*: Temporary affects to road during construction	*Direct Impacts*: None *Indirect and/or Short-Term*: Temporary affects to road during construction

S.6.1. Hazard Potential of Each Alternative

There are no nearby areas of high landslide potential, and recent reconnaissance of geologic hazards did not reveal any evidence of active faults, landslides, or rockfalls in the study area (Alpha Engineering Company 2010). Seismic hazards are considered relatively low as well; therefore, the most significant hazard at the site is high water flows associated with extreme storm events (100-year event).

The No Action Alternative assumes that the existing diversion would remain in place and irrigation water delivery would continue as is currently. In the 100-year storm event, the following may occur:

- Diversion failure
- Flooding from storm water flows
- Damage to property, structures, roads, and people

The Replace In Place alternative is in the same general location and proposes a similar structure to divert water from the Green River. This alternative does not pose an increased risk nor does it involve additional hazard associated with the installation of a new structure. In general, this alternative would provide a decreased hazard potential as compared to existing conditions.

The Replace In Place With Passages alternative is in the same general location and proposes a similar structure to divert water from the Green River. This alternative does not pose an increased risk nor does it involve additional hazard associated with the installation of a new structure. In general, this alternative would provide a decreased hazard potential as compared to existing conditions.

S.6.2. Permits and Approvals

In addition to EWPP requirements and mitigation measures that might be identified as part of this EIS, construction of the action alternatives would require the following permits or authorizations:

- Special Use Permit/Lease: Bureau of Land Management (BLM), Utah Fire, Forestry, and State Lands (FFSL)
- Clean Water Act (CWA) Section 404 authorization for work within the Green River
- CWA Section 402 National Pollutant Discharge Elimination System (NPDES) general permit for construction-related stormwater discharges
- National Historic Preservation Act (NHPA) Section 106 concurrence and Memorandum of Agreement with the State Historic Preservation Officer (SHPO) for the proposed Adverse Effect to the Green River Diversion.
- Antidegradation review by the Utah Division of Water Quality for potential impacts to the Green River
- Construction easements from Emery and Grand Counties, as well as property owners within the project area.

S.7. Public Participation and Agency Consultation

Project scoping questions, comments, and concerns were requested from the public and government agencies during the preliminary scoping period, both orally at public meetings and via written submittal of comments. The main goal of public participation during the scoping period was to involve a diverse group of public and government agency participants to solicit input and provide timely information regarding their concerns pertaining to the project and the proposed alternatives.

S.7.1. Original Public Scoping Meeting

A scoping notice was prepared and sent to interested parties and regulatory agencies on October 30, 2012. The scoping notice gave a description of the project, location and overview, purpose and need, identified preliminary scoping issues, and requested public participation. The scoping notice also identified the location of public meetings, contact information to submit written comments, and the scoping period closure date. One public scoping meeting was conducted on November 15, 2012. Written comments were submitted via mail, e-mail, facsimile, or comment card, and oral comments could have been submitted over the phone or in person. There were 11 oral or written comment documents received during the scoping period.

S.7.2. Second Public Scoping Meeting

Initially, it was determined that the project would follow NEPA guidelines through the EA process, and comments made during the first public scoping period as well as numerous agency meetings supported that. However, during consultation with the State Historic Preservation Officer, it was determined that the diversion could be of historic importance and possibly be eligible for listing on the NRHP. Consequently, any modification to the diversion might result in an adverse effect to the historic resource. The consequences of the action alternatives could result in impacts to the diversion considered "significant" to cultural resources. Due to the potential for a significant resource impact, NRCS decided to prepare an EIS for the project instead of an EA. The NOI to prepare an EIS was published and a second scoping period was opened during the period of May 29, 2013 to July 2, 2013.

The second public scoping meeting consisted of two Telebriefings on June 12, 2013. One was held at 2:00 PM to accommodate agency personnel and their schedules, and one at 6:00 PM to accommodate the general public and stakeholders. Written comments could have been submitted via mail, e-mail, facsimile, or comment card, and oral comments could have been submitted via phone or in person. There were 39 oral or written comment documents received for the Green River Diversion Project during the 2nd scoping period.

S.7.3. Agency Involvement and Consultation

The Proposed Action would require work within BLM property. NRCS has coordinated with the BLM (a cooperating agency) regarding the project. A temporary use permit would be required for the staging and access for the construction activities associated with the project. Consultation with the BLM will be ongoing, and once the project design has advanced further coordination would be necessary for modification of the rights-of-way and/or easements. Further coordination with the BLM would be performed as the project progresses during final design.

The Proposed Action would require work on the bed of the Green River, within the project area, which is considered sovereign land owned by the State of Utah and managed by the Utah Division of Forestry, Fire and State Lands (a participating agency). A Special Use Lease would be required for the construction

activities and the structure. Further consultation and coordination with FFSL will continue as the project progresses to ensure navigability through the Diversion.

NRCS has coordinated with Utah SHPO regarding the project under formal consultation. The report prepared for the project describing the results of the literature review and pedestrian survey concluded that there are cultural and historical resources within the project area. The report was submitted to Utah SHPO for a concurrence of an Adverse Effect to 2 NRHP-eligible sites, the Green River Diversion and the East Side Canal. The results of the consultation with SHPO on this project will be documented in the Final EIS.

Preliminary research and informal consultation with the USFWS (a participating agency) has concluded that the project will impact Threatened and Endangered species. A Biological Assessment will be prepared for the project describing the results of the literature review and pedestrian survey. From that point, consultation will be formalized with the agency to provide adequate project information and mitigation commitments to develop the Biological Opinion. The results of the consultation with USFWS on this project will be documented in the Final EIS.

The Proposed Action would require work within jurisdictional waters of the U.S. A USACE Section 404 permit will be required to complete the construction activities associated with the project. Consultation with the USACE will be performed once the project design has advanced to identify dredge/fill impacts (area and volume) to jurisdictional waters. The preliminary assessment of jurisdictional waters of the U.S described in this document have identified that there will be impacts from each of the Action alternatives. Further coordination with the USACE will be performed as the project progresses during final design.

CHAPTER 1. INTRODUCTION

1.1. Introduction

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) is working with the Utah Department of Agriculture and Food (UDAF) through the Emergency Watershed Protection (EWP) Program to rehabilitate the existing Green River Diversion (diversion) system (Figure 1-1) that will continue to provide water delivery to water rights holders.

Flooding in 2011 heightened concerns that a catastrophic failure of the diversion could result in significant losses to the local agricultural economy. The effects of recent flooding include cracking and chipping of concrete, undercutting of the downstream foundation sediments, and cracks associated with structural failure. This damage prompted the Green River Conservation District and, subsequently, UDAF to move forward with plans to rehabilitate the existing Green River Diversion, also known as the Tusher Diversion.

1.2. Authority

This Draft Environmental Impact Statement (DEIS) has been prepared under the authority of the EWP program (authorized by Section 216 of the Flood Control Act of 1950, Public Law 81–516, 33 U.S.C. 701b–1; and Section 403 of the Agricultural Credit Act of 1978, Public Law 95–334, as amended by Section 382, of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104–127, 16 U.S.C. 2203).

This document complies with the requirements of the National Environmental Policy Act of 1969 (NEPA), PL 91-190, as amended (42 U.S.C. 4321 et seq.), and its implementing regulations, which are set forth in the Council on Environmental Quality (CEQ) Regulations 40 CFR Parts 1500-1508; and NRCS NEPA policy and guidelines 70 CFR Part 650 (NRCS 2006 and 2011). The NEPA requires an evaluation of potential environmental impacts associated with federal actions.

1.2.1. Emergency Watershed Protection (EWP) Program

NRCS provides technical and financial assistance to communities that have been affected by natural disasters, including floods, fires, drought, hurricanes, etc. This kind of assistance is provided through the EWP program. The EWP program helps project sponsors and individuals implement emergency recovery measures to relieve imminent hazards to life and property created by a natural disaster that has caused a sudden impairment of a watershed (NRCS 2010a).

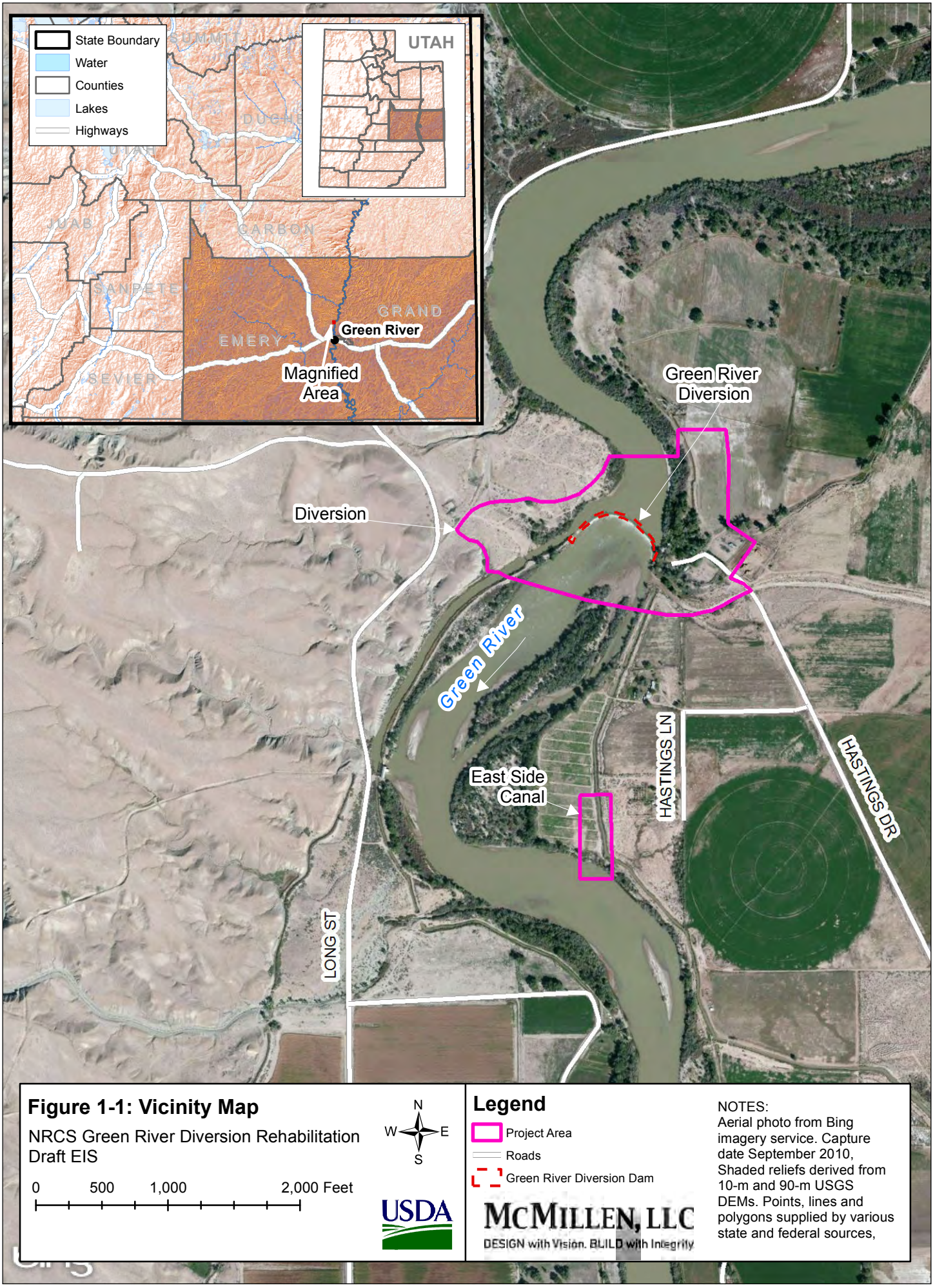

Figure 1-1: Vicinity Map

NRCS Green River Diversion Rehabilitation Draft EIS

0 500 1,000 2,000 Feet

N W E S

USDA

Legend

- Project Area
- Roads
- Green River Diversion Dam

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NOTES:
Aerial photo from Bing imagery service. Capture date September 2010, Shaded reliefs derived from 10-m and 90-m USGS DEMs. Points, lines and polygons supplied by various state and federal sources,

Rehabilitation of the diversion is eligible for funding under the EWP program, which authorizes funding (75% of project construction cost) and technical assistance (100% of design) to rehabilitate damage incurred to structures during natural disasters, including flood events.

A NEPA Programmatic Environmental Impact Statement (EIS) was prepared by the NRCS for the overall EWP program in 2004; however, the rehabilitation of this diversion does not fit within the analysis parameters of the Programmatic EIS. Therefore, this DEIS has been prepared to comply with the additional NEPA analysis required for this project.

In addition to repairing damage, the EWP Program requires that structures be updated to current technology and design standards as specified in the EWP Program Manual, Title 390, Part 511.4.A(12) (NRCS 2010a). EWP Program measures must also adhere to all applicable Federal, State, Tribal, and local laws and regulations as specified in the EWP Program Manual, Title 390, Part 510.1. (NRCS 2010a).

1.2.2. Cooperating and Participating Agencies

The CEQ's regulations implementing NEPA allow federal agencies (as lead agencies) to invite tribal, state, and local governments, as well as other federal agencies, to serve as cooperating agencies in the preparation of environmental impact statements. The NRCS, as the lead agency, invited those agencies with some close association with the project to be cooperating agencies. The Bureau of Land Management (BLM) accepted the invitation to be a Cooperating Agency. NRCS will also be coordinating with the Utah Division of Forestry, Fire and State Lands in regards to becoming a cooperating agency for the project. The following federal, state, and local government agencies have been involved in the process and are considered participating agencies. Section 5.2, Agency Consultation includes further description on the agency approvals and permitting required for the project.

- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- Environmental Protection Agency
- Bureau of Reclamation
- Utah Department of Water Resources
- Utah Division of Forestry, Fire and State Lands
- Utah Division of Wildlife Resources
- Utah Department of Environmental Quality
- Emery County
- Grand County
- City of Green River

1.3. Existing Conditions

The Green River Diversion is located on the Green River approximately 6 miles upstream of the town of Green River, Utah. The Green River watershed is nested within the Colorado River watershed, which serves about 27 million people and irrigates nearly 4 million acres of land across several states of the Western United States (Gerner et al. 2006) (Figure 1-2). Surface waters of the Green River originate across a 40,500 square-mile basin that includes parts of Wyoming, Utah, and Colorado.

The diversion (Pictures 1-1 and 1-2) is adjacent to the Tusher Wash and is often referred to as the Tusher Diversion. The diversion structure spans the 750-foot width of the river and diverts water to water right holders (irrigators and hydropower users) on both sides of the river. The diversion consists of four features: the main diversion structure, the West Side Raceway, the East Side Canal, and the water wheel (Figures 1-3 and 1-4).

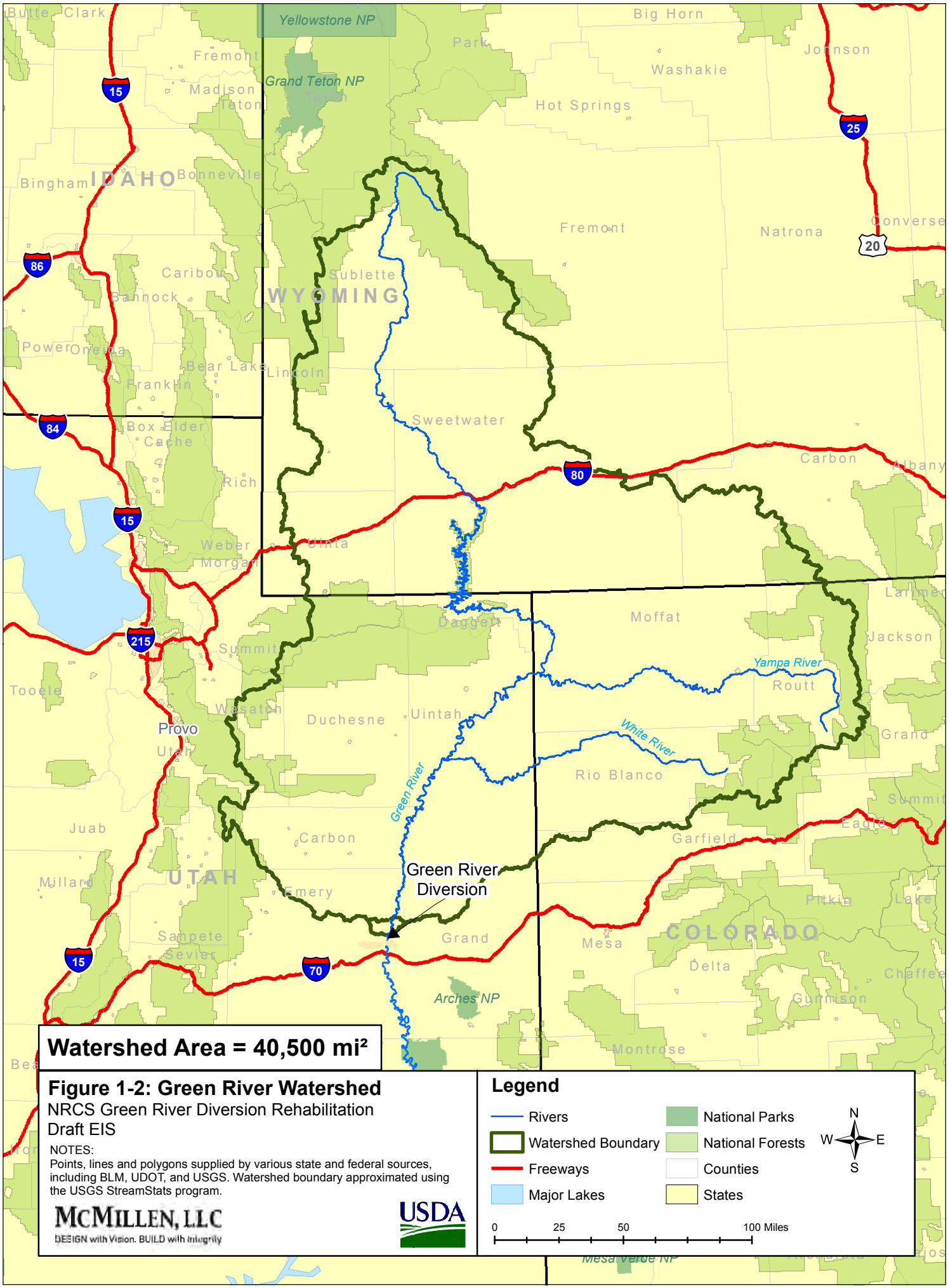

Figure 1-2: Green River Watershed

NRCS Green River Diversion Rehabilitation
Draft EIS

NOTES:
Points, lines and polygons supplied by various state and federal sources, including BLM, UDOT, and USGS. Watershed boundary approximated using the USGS StreamStats program.

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Picture 1-1. East End of Diversion

Picture 1-2. West End of Diversion

Picture 1-3. Example of Damaged Area

Prior to damage (Picture 1-3) caused in recent spring runoff and storms, the water users identified a number of deficiencies with the diversion including structure and water control gate deterioration, sediment loading, inability to meet water right diversions, flooding, and limitations to recreation. The existing structure has suffered severe damage from recent flooding above and beyond what was identified prior to the 2011 flood event. This recent damage has brought forth concerns regarding the ability of the structure to withstand another flood event similar to the 2011 flood.

The Green River in the vicinity of the diversion is also used by boating recreationists. However, the existing structure does not allow safe downstream boat passage during low flows, as numerous members of the boating public commented during the public scoping period.

1.3.1. Irrigation System

The existing diversion structure is located immediately upstream of Tusher Wash and delivers surface water for three uses (Figure 1-3, Pictures 1-1 and 1-2): the Green River Canal, the Thayn Hydropower Plant, and the East Side Canal. The diversion is designed to raise the water surface elevation and provide water to irrigation facilities on both sides of the river.

1.3.1.1. Historic Hastings Ranch, Water Wheel

The water wheel located at the east side of the diversion (Picture 1-4; Figure 1-4) is privately owned by the Hastings Ranch. The structure is a 28-foot welded steel wheel located near the location of the original

wood wheel. This site has been in service since the 1940s, and provides water for irrigation on approximately 60 acres of cropland. The water wheel is not currently delivering water to cropland.

Picture 1-4. Water Wheel at Hastings Ranch, East Bank

(foreground: existing steel wheel; background: original wood wheel)

1.3.1.2. East Side

At the east side of the diversion (Pictures 1-1 and 1-5), water rights are allocated to the East Side Canal Company and the Hastings Ranch water wheel (noted in previous section; Figure 1-4). The East Side Canal receives water from an inlet upstream of the diversion, through a siphon system that passes water under Tusher Wash, and then into a canal that transports water to the south. The east side of the diversion likely provides some fish passage over an existing break on the east side. However, this fish passage was damaged during the 2011 flood event and there is currently about a 2-foot drop during low flows in the Green River, rendering it likely ineffective as a fish passage except during the highest flows.

Picture 1-5. East Side Fish Passage

1.3.1.3. West Side

On the west side of the river, diverted water travels through 8 side-by-side headgates (Figure 1-4) and down the canal (raceway) approximately 0.4 miles to the entrance of the Green River Canal and the Thayn Powerhouse (Pictures 1-1, 1-6 and 1-7). The existing "8-Gate" structure is substandard and does not allow for crossing of the raceway, which impedes the operation and maintenance process at the diversion.

Picture 1-6. West End of Diversion

Picture 1-7. West Side Raceway Headgate Structure

1.3.1.4. Sediment Reduction

The existing sluice gate (Picture 1-8) is located on the west side of the diversion structure. The sluice gate is a slide-type gate which is difficult to operate to sluice the sediment through the structure due to the damaged concrete.

Picture 1-8. West Side Sluice Gate

1.3.2. Tusher Wash

A large amount of sediment has been deposited at the point where the Tusher Wash meets the Green River (Picture 1-9), downstream of the diversion structure (Figure 1-4). The wash is a 15-foot wide ephemeral drainage which is dry most of the season and used most often as an access road.

Picture 1-9. Tusher Wash Entrance into the Green River

1.3.3. Hydropower Plant

The Thayn Hydropower Plant is located on the west side of the river, where diverted water travels through the 8 side-by-side headgates and down the West Side Raceway approximately 0.4 miles (Figure 1-3). The majority of the flow in the raceway is delivered to the Thayn Hydropower Plant which passes the water back into the Green River. The remainder of the water is delivered to two irrigation canals (Green River Canal and Thayn Ditch).

The Upper Colorado River Endangered Fish Recovery Program, through funding from the Bureau of Reclamation (BOR) and technical oversight from the U.S. Fish and Wildlife Service (USFWS), is currently evaluating the possible use of a fish return system downstream of the hydropower plant. Further detail on this future project located in the immediate vicinity is provided in Section 3.5.

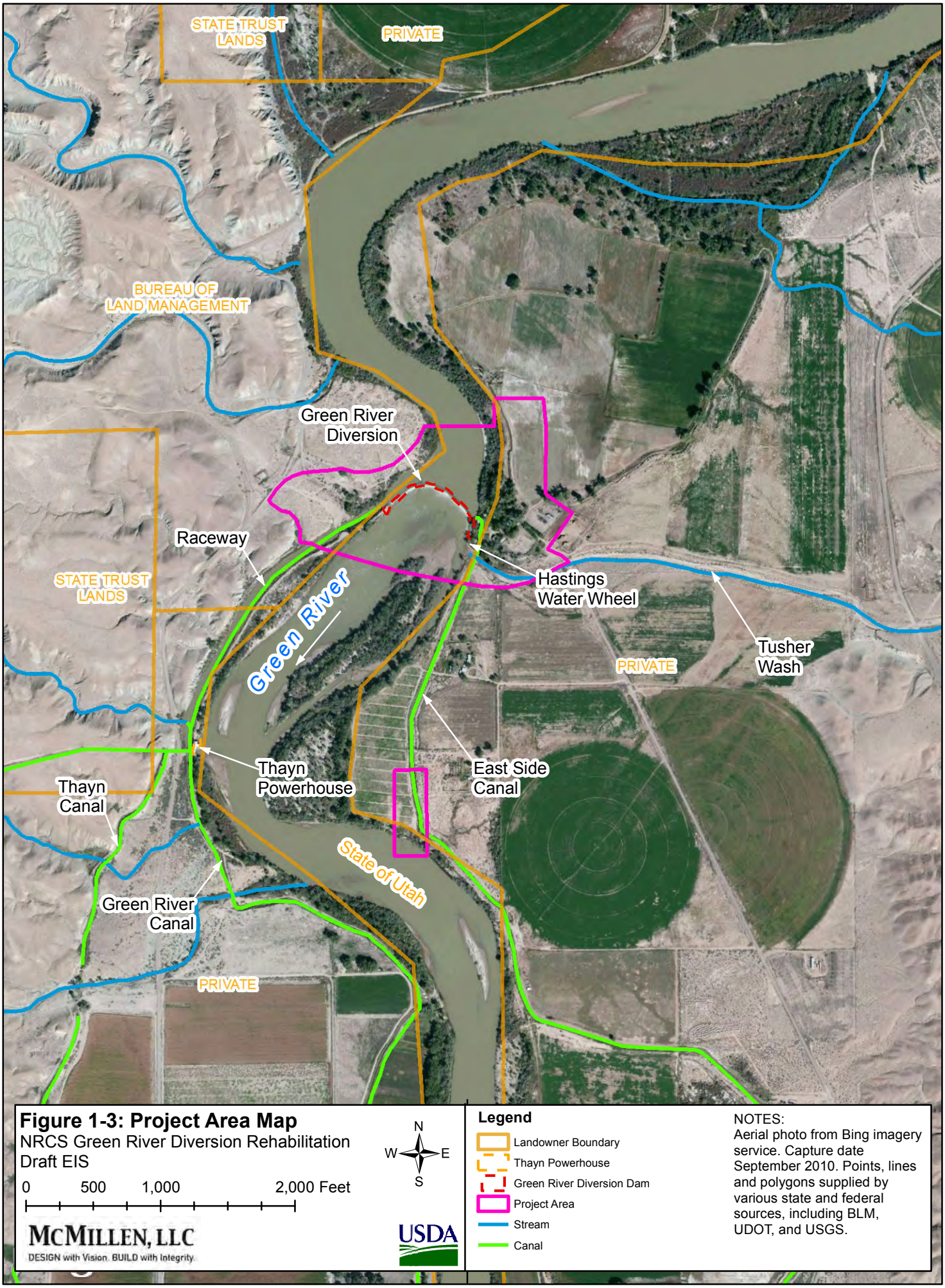

Figure 1-3: Project Area Map
NRCS Green River Diversion Rehabilitation
Draft EIS

1.4. Project Scope

The NRCS Utah State Office announced its intent to prepare an EIS for the Green River Diversion Rehabilitation Project in May 2013.

This DEIS is being prepared by the NRCS to comply with the requirements of the National Environmental Policy Act of 1969 (NEPA) and its implementing regulations. The format of this document follows the outline required for NEPA documents (NRCS 2010b and 2011).

1.4.1. Project Scoping Efforts and History

Agency and stakeholder participation, along with public involvement, are key components that lead the NEPA process. Project information was made available to the public during the first scoping period from October 30, 2012 to November 30, 2012. A public scoping meeting was held on November 15, 2012 at the Green River City Hall. Numerous meetings with agency officials and stakeholders occurred during that time period. Based on the results of these scoping efforts, an Environmental Assessment (EA) was determined to be the correct course of action for the project.

Consultation with the Utah State Historic Preservation Office (SHPO) resulted in a determination that the diversion is historic and may be eligible for listing on the National Register of Historic Places (NRHP). Consequently, any modifications to the diversion may result in an adverse effect to the historic resource. This study has included a wide range of alternatives (as detailed in Chapter 3, Alternatives), some of which would result in impacts to the diversion considered "significant" to cultural resources.

Due to the potential for a significant resource impact, NRCS decided to prepare an EIS for the project instead of an EA. The Notice of Intent (NOI) to prepare an EIS was published, and a second scoping period was opened from May 29, 2013 to July 2, 2013. The EIS complies with the CEQ regulations, which require an evaluation of potential environmental impacts associated with federal projects and actions:

> *The NRCS State Conservationist must prepare an EIS when the action will result in significant adverse impacts that cannot be mitigated, even if on balance the action will have a beneficial effect. The NRCS State Conservationist must exercise discretion in determining the appropriate level of documentation when there are significant positive impacts, recognizing that it may be advisable to prepare an EIS in certain situations, such as when there is controversy regarding environmental effects.* (NRCS 2010b)

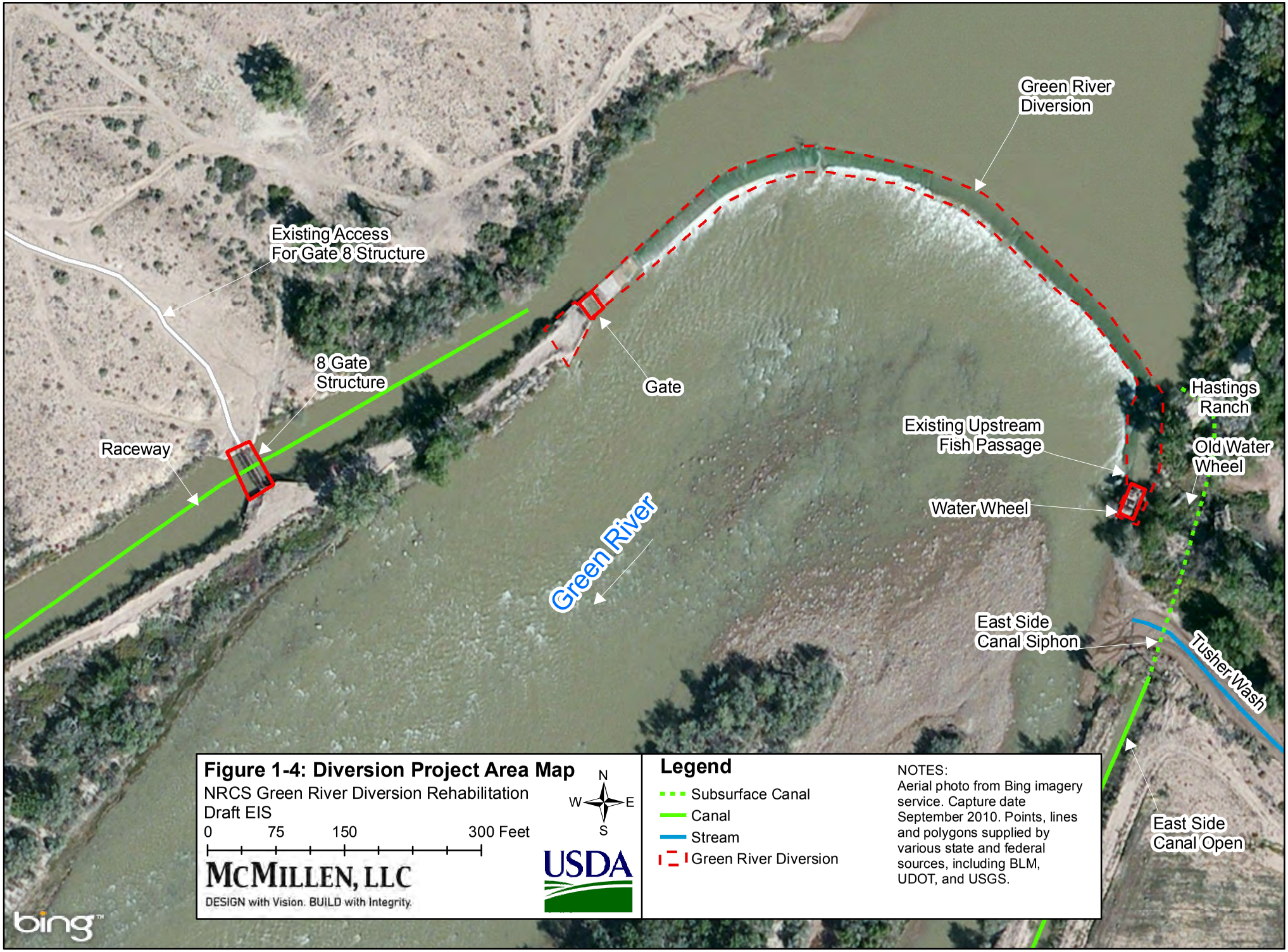

Figure 1-4: Diversion Project Area Map

NRCS Green River Diversion Rehabilitation
Draft EIS

0 75 150 300 Feet

N
W E
S

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Legend

- Subsurface Canal
- Canal
- Stream
- Green River Diversion

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Points, lines and polygons supplied by various state and federal sources, including BLM, UDOT, and USGS.

1.5. Purpose and Need

1.5.1. Purpose of the Proposed Action

The purpose of the proposed action is to rehabilitate the existing Green River Diversion. The project will rehabilitate the diversion due to damage caused by past flood events, upgrade the diversion infrastructure to current design standards, maintain the level of water delivery to the existing water rights holders, and comply with applicable Federal rules and regulations.

1.5.2. Need for the Proposed Action

The need for the project is to maintain existing functions of the diversion for water delivery to water rights holders (irrigation canals and the powerhouse).

1.5.3. Laws, Regulations, Policies and Determinations

Table 1-1 summarizes the laws, regulations, and policies that could apply to the proposed action and the determinations that NRCS and other agencies might need to make in order to implement the proposed action. These laws, regulations, and policies are in addition to the EWP Program requirements.

Table 1-1. Laws, Regulations and Agency Responsibilities

Law, Regulation, or Policy	Issuing /Approving Agency	Determination	Responsibilities, Concurrences and Timing
Federal Laws, Regulations, and Policies			
BLM Regulation 43 CFR Part 10010 Subparts A through G. sections 10010.1 through 10010.62	BLM	Easements and Land Acquisitions; modification of existing rights-of-way; temporary construction permitting.	UDAF or contractors, with NRCS concurrence; complete all permitting and acquisition before construction begins.
Clean Water Act (33 USC 1251 and subsequent sections), Section 401[a]	UDEQ-DWQ	Water quality certification; required only if the action is subject to authorization under CWA Section 404.	CWA Section 404 permittee (UDAF or contractors, with NRCS concurrence); receive certification before construction begins.
Clean Water Act, Section 402 (National Pollutant Discharge Elimination System)[a]	UDEQ-DWQ	Compliance with the State's general permit for construction-related stormwater discharges. • Small Municipal Separate Storm Sewer System (MS4) general permits issued to municipalities.	CWA Section 402 permittee (UDAF or contractors, with NRCS concurrence); demonstrate compliance before construction begins.
Clean Water Act, Section 404	USACE	Authorization for the discharge of fill material to waters of the United States; depending on the magnitude of impact, project activity might be authorized under either an existing General (Nationwide) Permit or a new Standard (Individual) Permit.	CWA Section 404 permittee (UDAF or contractors, with NRCS concurrence); receive authorization before construction begins.
Executive Order 11990: Protection of Wetlands	NRCS	Compliance with the Executive Order.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.
Executive Order 11988: Floodplain Management	NRCS	Compliance with the Executive Order.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.

Law, Regulation, or Policy	Issuing /Approving Agency	Determination	Responsibilities, Concurrences and Timing
Farmland Protection Policy Act (7 USC 4201)	NRCS	Compliance with the Act.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.
Fish and Wildlife Coordination Act (16 USC 661 and subsequent sections)	USFWS and UDWR	Compliance with the Act; applies to activity that would modify the Green River. Consultation and coordination as part of the EIS process.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.
Endangered Species Act (16 USC 1531 and subsequent sections)	USFWS	Consultation under Section 7 of the Act to determine the project's potential to affect listed species. Consultation as part of the EIS process.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.
Migratory Bird Treaty Act (16 USC 703 and subsequent sections)	USFWS	Compliance with the Act.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process. UDAF or sponsor's contractor monitors compliance during construction, if necessary.
Bald and Golden Eagle Protection Act (16 USC 668)	U.S. Department of the Interior (DOI), usually USFWS	Compliance with the Act.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process. UDAF or sponsor's contractor monitors compliance during construction, if necessary.
Executive Order 13112: Invasive Species	NRCS	Compliance with the Executive Order.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.
National Historic Preservation Act[a] (16 USC 470)	Utah SHPO; and ACHP	Consultation under Section106 of the Act to determine the project's potential to affect listed or eligible resources.	Federal lead (NRCS) and cooperating (BLM) agency; consultation during the EIS process.
Executive Order 12898: Environmental Justice for Low-Income and Minority Populations	NRCS	Compliance with the Executive Order.	Federal lead (NRCS) and cooperating (BLM) agency; considered during the EIS process.
Utah Laws, Regulations, and Policies			
Water Rights	$UDWR_t$	Consistency with permitted water rights.	NRCS considers during EIS process; ultimately the responsibility of the permittee.
Sovereign Lands (Utah Admin Code 65A-1-2 and 65A-10-1)	FFSL	Compliance with State code. Special Use Lease required. Sovereign lands are managed under the Public Trust Doctrine using multiple use/sustained yield principles and must ensure that all uses on sovereign lands are regulated such that protection of navigation, fish and wildlife habitat, public recreation, and water quality are balanced against the economic necessity or benefit to be derived from any proposed use.	NRCS considers during EIS process; ultimately the responsibility of the permittee.

Law, Regulation, or Policy	Issuing /Approving Agency	Determination	Responsibilities, Concurrences and Timing
Stream Alteration	UDWRt	Compliance with State code.	NRCS considers during EIS process; ultimately the responsibility of the permittee or its contractor.
Antidegradation (Water Quality)	UDEQ-DWQ	Compliance with State code for maintenance of high-quality waters; requires separate review.	NRCS considers during EIS process; ultimately the responsibility of UDAF or permittee.
Drinking Water Source Protection	UDEQ-DWQ	Compliance with State code.	NRCS considers during EIS process; ultimately the responsibility of UDAF, the permittee, or its contractor.
Utah Air Quality Rules	UDAQ	Compliance with applicable rules for construction activity.	NRCS considers during EIS process; ultimately the responsibility of UDAF, the permittee, or its contractor.

[a]Federal law for which implementation has been partially or wholly delegated to the State. Note: see Acronyms and Abbreviations for all short forms listed.

1.5.4. Resources Studied In Detail

Table 1-2 lists the resource considerations that were determined to be relevant to the decisions that must be made concerning the project and require further analysis in this DEIS. These resources were selected by internal project coordination and through public scoping.

Table 1-2. Resources Studied in Detail

Resource Category	Specific Resources Studied	Resource Category	Specific Resources Studied
SOIL	Streambank Erosion Prime and Unique Farmlands Geology	PLANTS	Endangered and Threatened Species Invasives Riparian Areas
WATER	Surface Water Quality, Sedimentation Hydrology, Water Rights Groundwater, Floodplains Waters of the US/Wetlands Climate Change	ANIMALS	Endangered and Threatened Species Invasives Fish and Wildlife Habitat
AIR	Air Quality	HUMANS	Cultural Resources Hazardous Toxic/Radiologic Wastes Recreation, Wild and Scenic Rivers Public Health and Safety Visual/Aesthetics/Scenic Beauty Land Use, Infrastructure, Noise

1.5.5. Resources Eliminated From Further Study

As directed by CEQ regulations 1500.1(b), 1500.2(b) and other sections, the NRCS eliminated the following resource considerations from detailed study because the proposed action would cause only inconsequential or no effect to occur to these issues. In accordance with NRCS policy, a Damage Survey Report (Appendix C) was completed for the proposed project that documented the general environmental conditions at the project site. Other than the information presented in Table 1-3 below, this DEIS contains no further information on these eliminated resource issues.

Table 1-3. Resources Eliminated from Further Study

Resource Category	Specific Resources Eliminated	Resource Category	Specific Resources Eliminated
SOIL	Upland Erosion	PLANTS AND ANIMALS	Natural Areas Essential Fish Habitat Coral Reefs
WATER	Regional Water Management Plans Coastal Zone Management Areas	HUMANS	Parklands

CHAPTER 2. AFFECTED ENVIRONMENT

The purpose of this chapter is to describe the area that could be affected by the proposed alternatives, including the areas of ecological, cultural, social, aesthetic, and economic resources affected by the proposed action. The purpose of describing the affected environment is to define the context in which the impacts could occur.

In the following sections of this report the *project area and/or vicinity* is defined as the resources that occur within ½ mile to one mile of the Green River Diversion. The term *study area* is often much larger, typically county wide to ensure that all resources are accounted for during project research. The *project site* is synonymous with *project footprint* and only includes the area that would be disturbed during construction.

2.1. Soil Resources

Soil information presented in this section has been summarized from NRCS Web Soil Survey data (NRCS 2013a). Soils in the study area (Figure 2-1) have been mostly derived from the Mancos Shale. In the study area portion of Grand County, two soil types are prevalent, including the Redbank-Flatnose families association, and the Toddler-Ravola-Glenton families association. Emery County soils in the area include Beebe loamy fine sand, Ferron-Green River-Rafael complex, Garley-Ravola-Huntsman complex, Hunting loam, strongly saline, Penner loam, and Vickel-Utaline-Persayo complex. The dominant soils within the study area are characteristic of river valleys and floodplains and occur at elevations comparable to the diversion and surrounding area. These soils are briefly described in Table 2-1.

Table 2-1. NRCS Web Soil Survey Data

Name	Landform	Ecological Site	Slope (%)	Comment
Redbank-Flatnose Association	Flood plains	Greasewood and/or Coyote Willow	0 to 3	Comprised of nonsaline, porous fine sandy to gravelly loams. Occurs adjacent to the east bank of the river from 4,000 to 6,500 feet elevation.
Toddler-Ravola-Glenton Families Association	Drainageways, flood plains	Castle Valley Saltbush	0 to 3	Comprised of well-drained, nonsaline to slightly saline, silt loams and fine sandy loams.
Ferron-Green River-Rafael Complex	Flood plains	Inland Saltgrass and Fremont Cottonwood	1 to 2	Comprised of poorly drained, nonsaline to moderately saline, very fine to fine sandy loams.
Garley-Ravola-Huntsman Complex	Flood-plain Steps	Big Basin Sagebrush, Shadscale, and/or Black Greasewood	1 to 4	Comprised of well-drained, very slightly saline to moderately saline, clay, fine sandy, gravelly sandy clay, and gravelly fine sandy loams.
Vickel-Utaline-Persayo Complex	Pediments	Shadscale, Indian Ricegrass, and/or Mat Saltbush	8 to 45	Comprised of well-drained, nonsaline to slightly saline, gravelly or clay loams that occur between 4,000 and 6,400 feet elevation.

Soil borings completed during preparation of a recent design report provided soil data from the surface to as deep as 54.5 feet at sites on and around the diversion (Alpha Engineering Company 2010). Data confirmed that soils are a mixture of silty sand, sand with silt and gravel, and loose gravel with silt and sand. Some areas have sandstone boulders and cobbles in a silty sand matrix.

2.1.1. Geology

The Emery County General Plan describes the geology of the area:

> *Emery County is located 'where the desert meets the mountains,' at the border of the Colorado Plateau and the High Plateaus. On the western side of the County is the Wasatch Plateau, which is the major water source for the County. The San Rafael Swell dominates the County's center with its rugged reefs, 'castles' and gorges. East of the San Rafael Swell is the Green River Desert, an arid district which has been historically important to ranching operations located in the lower San Rafael Valley. The eastern border of the County is formed by the Green River.* (Emery County 2008)

The geology of the area of consideration is comprised of Quaternary alluvium and colluvium, with areas of older alluvium, and Mancos Shale (Hintze et al. 2000). The Green River floodplain is largely comprised of Quaternary alluvium deposits of sands and gravels, while the Mancos Shale dominates the area immediately surrounding the diversion. The Mancos Shale was deposited approximately 95 to 80 million years ago during the Cretaceous period, when an inland sea covered much of the western interior of the country. Deposition in this marine environment resulted in the accumulation of alkali salts that result in moderate to high concentrations of dissolved minerals and salts in local groundwater.

Topography within and around the study area ranges from 4,079 feet at the diversion's crest elevation, to approximately 4,190 feet at a high point to the west of the river (Blue Castle Butte Quadrangle). Landslide hazards are generally of very low to low potential in the study area according the Utah Geological Survey (2007). Moderate landslide potential does occur upstream and downstream of the diversion west of the river in small areas. These areas are associated with the extreme slopes of buttes within the Beckwith Plateau. There are no nearby areas of high landslide potential.

A recent reconnaissance of geologic hazards did not reveal any evidence of active faults, landslides, or rockfalls in the study area (Alpha Engineering Company 2010). Seismic hazards are considered relatively low. The most significant hazards at the site are high water flows associated with extreme storm events.

2.1.2. Stream Bank Erosion

Soil erosion has been noted as a common problem for Emery and Grand Counties (UACD 2011, 2012). As noted above, local soils are primarily derived from Mancos Shale. These soils are highly erosive and have inconsistent shrink/swell properties (UACD 2012). Runoff from intense summer rainfall events over barren slopes can produce flash floods in the dry washes and canyon bottoms of this region. These floods increase sediment deposition and loading in streams, ultimately causing water quality and flood storage capacity issues.

These natural erosional forces are accelerated by alteration of soils through changes in stream geomorphology, development of adjacent lands, and use of adjacent lands for agriculture or grazing. The construction of the diversion resulted in changes to the natural flow regime and sediment transport in the Green River. Sediments in the river now become trapped behind the diversion and enter the raceway and ditch. The trapping of sediments behind the diversion can cause erosion downstream of the diversion or along the riverbanks.

Stream bank erosion occurs naturally but increases when vegetation is removed from the banks. Some areas of the bank around the diversion have minimal riparian vegetation and human disturbance that can contribute to erosion.

2.1.3. Sedimentation

The Green River carries a high suspended sediment load and is experiencing sediment deposition at several locations along the Green River Canal. These alluvial deposits include silty sand, gravel, cobbles, and occasional boulders (Alpha Engineering Company 2010). The physical removal of the sediment is very costly (UWRL 2010) and irrigators are interested in ways to minimize the transport and deposition of sediment in the canal.

A study being conducted by the Utah Water Research Laboratory (UWRL) for the Green River Canal Company (GRCC) is currently underway regarding sediment found in the canal as a result of the sedimentation process. The study has multiple objectives, including establishment of a grain size distribution, classification of the types of soils present, and determination of the minimum velocity required to maintain suspension of the silt particles entering the irrigation canal. A second objective is to create an accurate map of the Green River irrigation canal including the location of all turnouts, returns, and check gates to aid the GRCC in locating, governing, and maintaining the irrigation structures in its system. The third objective is to create a spreadsheet accounting model that describes the operating conditions of the canal and allows canal operators to minimize sedimentation by identifying potential problem areas. The fourth objective is to provide the GRCC with a set of operational guidelines for the Green River irrigation canal, which also describes how the Green River canal model functions. The final objective is to provide the GRCC with recommendations for canal operation in order to limit sedimentation. Research on the canal will continue until the objectives are met (UWRL 2010), and coordination will continue with the UWRL to incorporate results within the design of the Green River Diversion Rehabilitation.

2.1.4. Prime and Unique Farmlands

Prime and unique farmland is a designation for areas that support the growth of specific high-value food and fiber crops and are considered of national importance. There are no prime or unique farmlands within the project area, though an area of prime farmland does occur to the south of the project area. Farmland of statewide importance, however, exists immediately adjacent to the river.

Farmland of statewide importance is identified by state agencies as important for agricultural use in the state, but is not of national significance. This land must be irrigated to receive this designation. On the east bank, immediately upstream and downstream of the diversion, farmland of statewide importance is present where Redbank-Flatnose soils (047, as depicted on Figure 2-1) occur, agricultural uses are present, and irrigation is adequate (NRCS 2013a, UACD 2011).

Prime farmland south of the project area occurs where Penner Loam soils are present (NRCS 2013a). This soil is only considered prime if it is adequately irrigated and if soil erodibility and climate meet established criteria.

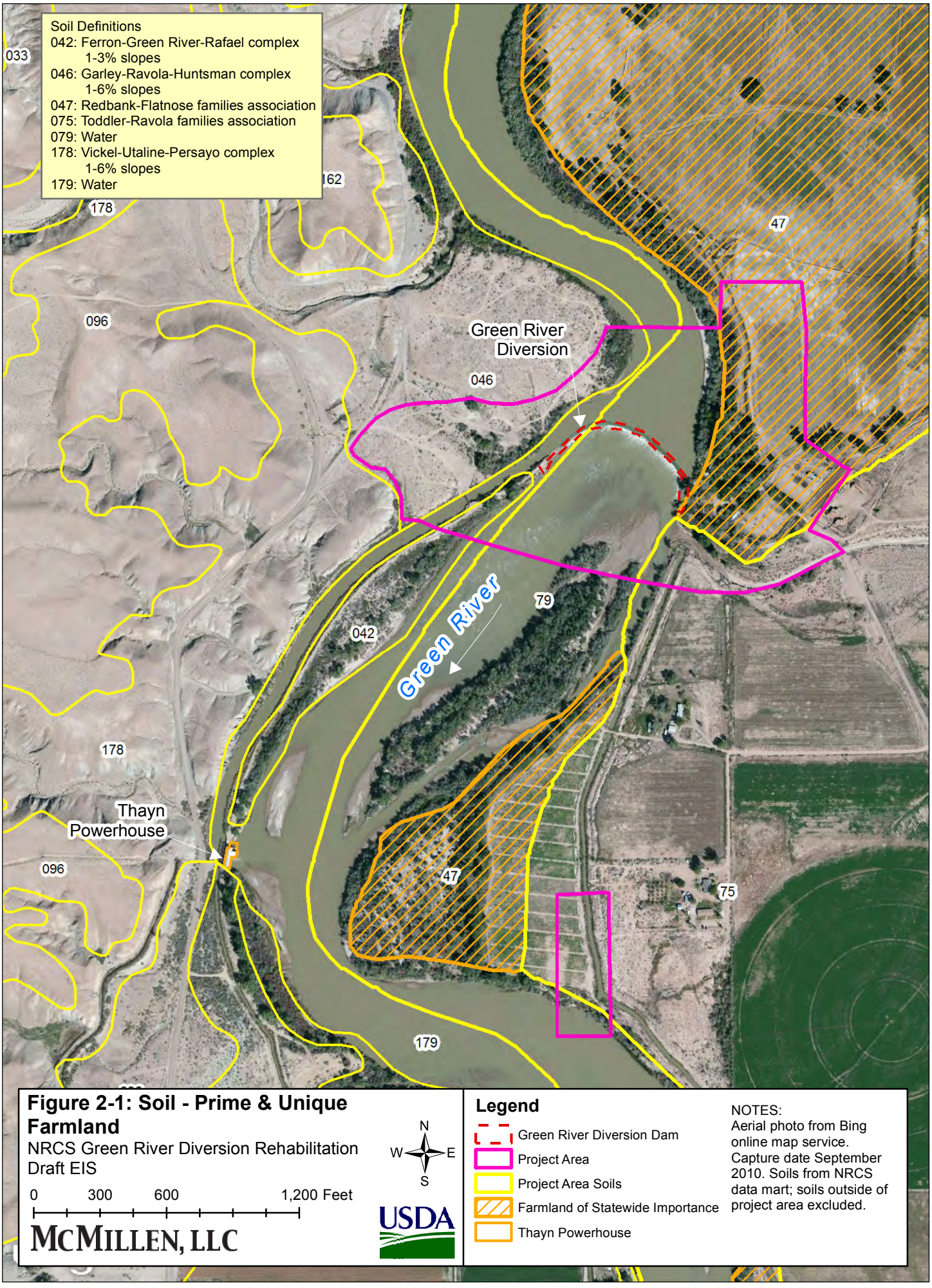

Figure 2-1: Soil - Prime & Unique Farmland

NRCS Green River Diversion Rehabilitation
Draft EIS

0 300 600 1,200 Feet

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USDA

Legend

- Green River Diversion Dam
- Project Area
- Project Area Soils
- Farmland of Statewide Importance
- Thayn Powerhouse

NOTES:
Aerial photo from Bing online map service. Capture date September 2010. Soils from NRCS data mart; soils outside of project area excluded.

2.2. Water Resources

The Green River in Utah from the confluence with the Colorado River to the state line is designated for the following beneficial uses: 1) domestic water supply (with appropriate treatment); 2) primary contact recreation; 3) protection of warmwater species and aquatic life; and 4) agricultural uses (State of Utah 2013). This segment of the Green River in the project area is not listed on the State of Utah's 303(d) list of impaired water bodies and meets most beneficial uses. Currently, it is listed as achieving all beneficial uses except primary contact recreation, but does achieve infrequent contact recreation (Utah Division of Water Quality 2013).

Also protected for secondary contact recreation where there is a "low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting and fishing" (UAC 2013).

2.2.1. Water Quality

In 2004-2005, the U.S. Geological Survey (USGS) conducted an investigation of water quality in the Green River within the reach just upstream of the Green River Diversion down to the city of Green River. The study looked at specific dissolved solids concentrations, which were observed in wide ranges within the reach. Waters diverted for irrigation typically had much lower concentrations, while drainage water from agricultural runoff returning to the river had much higher concentrations (Gerner et al. 2006). Despite the local high concentrations of suspended sediment, no Total Maximum Daily Load (TMDL) rules exist for the reach. Finally, a uranium mill tailings disposal site is located approximately 8 miles downstream of the project site. The most recent evaluation of the disposal facility concluded that no constituents of concern (arsenic, nitrate + nitrite, selenium, sulfate, or uranium) had exceeded their respective proposed alternate concentration limits at sampling locations within the Green River (DOE 2012).

Water temperature in the Green River near the city of Green River was periodically recorded between 1952 and 1981. Although there is variation throughout, the completion of Flaming Gorge Dam in the late 1960s has dampened this variation, leading to a more uniform inter-annual average temperature. Overall, the average annual temperature in the Green River is about 13.9 °C (57.0 °F). Also, the presence of the diversion appears to have led to an overall drop in average water temperature, most likely due to the thermal stratification in the reservoir and the initial bottom release of water, despite the fact that water is now released at multiple levels from within the reservoir.

The State of Utah's Administrative Code (UAC) section 19-5-110 requires the waters of the state be grouped into classes in order to protect against controllable pollution impacting the designated beneficial uses (UAC 2013). The segment of the Green River that is located within the project area has been designated as Class 2B which is defined by the UAC section R317-2-6 as "Protected for infrequent primary contact" (UAC 2013).

2.2.2. Hydrology

The watershed drainage area upstream of the Green River Diversion is approximately 40,500 square miles (Figure 1-2). The Green River Watershed is nested within the Colorado River Watershed, which serves about 27 million people and irrigates nearly 4 million acres of land across several states of the Western United States (Gerner et al. 2006). Surface waters of the Green River originate across the basin which includes parts of Wyoming, Utah, and Colorado. USGS Gaging Station 09315000, located approximately 8 river miles downstream of the diversion near the city of Green River, has a 111-year record of discharge that indicates an average daily flow rate of 6,085 cubic feet per second (cfs). However, flow in the Green River is partially regulated by Flaming Gorge Dam, which is located 407 river miles from the mouth of the Green River.

Flaming Gorge Dam was completed in 1965, after which flows in the Green River were regulated due to water storage in Flaming Gorge Reservoir. Peak discharges above the Green River Diversion were therefore estimated using the HEC-SSP program (USACE 2010) for the years 1965 through 2009. Results are given in Table 2-2 for the 2-, 25-, 50-, and 100-yr events. Results in the table are similar to results published elsewhere (Gerner et al. 2006).

Table 2-2. Peak Discharges For Various Return Periods, Above Green River Diversion

Statistic	Flow (cfs)
2-year	21,386
25-year	40,726
50-year	44,603
100-year	48,170

Flow rates estimated using StreamStats and the HEC-SSP program (Concept Design Report, McMillen 2014)

The Concept Design Report (Appendix B) provides further detail on the hydrology of the Green River in the vicinity of the project. The analysis has concluded that the minimum flow expected at the Green River Diversion structure is 1,132 cfs.

2.2.3. Water Rights

Several water rights exist on the river near the project location. Some of these rights are approved, while others have been perfected. A perfected water right is a right that has been both approved, and consummated, i.e. the water right has actually been put to beneficial use. A list of the water rights near the project is provided in Table 2-3 and is shown in Figure 2-2.

Table 2-3. Water Rights for Study Area

Map Location	Water Right ID	Owner	cfs	ac-ft	Use	Point of Diversion
1	91-5059	D.Carter		16	I	Unidentified
	91-294	Green River Canal Co	60	5888.2	I, S, D	Unidentified
	91-5043	Green River Canal Co	20		R	Tusher Dam

Map Location	Water Right ID	Owner	cfs	ac-ft	Use	Point of Diversion
	91-39	Green River City	220		H	Below Diversion; Inactive
	91-5075	Gunnison Butte Mutual Irr. Co.		2879.7792	I	Tusher Dam
	91-113	L. Thayn	35		I	Unidentified
	91-4130	L. Thayn	600		H	Raceway
	91-5161	L. Thayn		3153	I	Tusher Dam
2	92-43	C.Dunham, H.Hastings, C.Ross	60		H	Unidentified
	92-74	C.Dunham, H.Hastings, C.Ross	5		I	Unidentified
	92-620	Sequoiadendron, LLC		2.71	I, S	Unidentified
3	92-657	JD Banasky		801.5946	I	East Side Canal
	92-661	G.Clark or E.Clark		32.82	I	East Side Canal
	92-656	C.Dunham		521.82	I	East Side Canal
	92-667	C.Dunham		68.34	I	East Side Canal
	92-660	K. and P. Dunham		86.64	I	East Side Canal
	92-659	N. Dunham		522.6	I	East Side Canal
	92-658	H. Nelson		37.26	I	East Side Canal
4	92-633	Eastside High Ditch Irr. Co.		4900	I	Unidentified
	92-4	East Side Irr. Co.	6		I	Unidentified
	92-638	Gunnison Butte Mutual Irr. Co.		8238.9054	I	Eastside Diversion
	92-69	TJ Hastings	1		I	Unidentified
	92-21	B. and D. Nelson	2		I	Unidentified
	92-646	SITLA		526.12	I	Unidentified
	92-645	SITLA		51.88	I	Unidentified
5	92-622	Eastside High Ditch Irr. Co.		3480	I	Existing div dam, headgate, canal

ac-ft = acre feet; SITLA = State of Utah School and Institutional Trust Lands Administration

Uses: I = irrigation; S = stockwater; D = domestic; H = hydropower plant; R = raceway

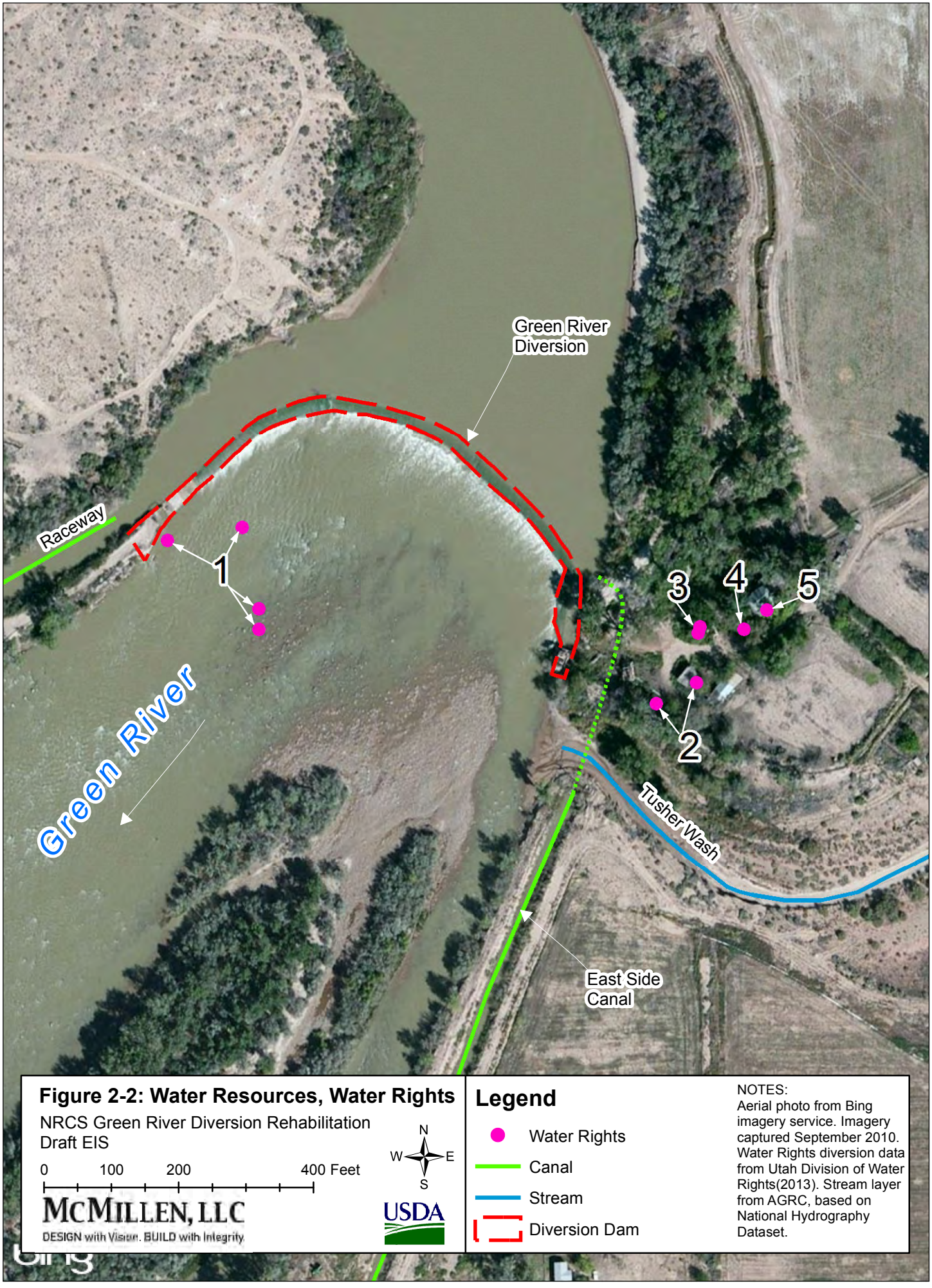

Figure 2-2: Water Resources, Water Rights

NRCS Green River Diversion Rehabilitation
Draft EIS

0 100 200 400 Feet

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Legend

- Water Rights
- Canal
- Stream
- Diversion Dam

NOTES:
Aerial photo from Bing imagery service. Imagery captured September 2010. Water Rights diversion data from Utah Division of Water Rights(2013). Stream layer from AGRC, based on National Hydrography Dataset.

2.2.4. Groundwater

USGS conducted a study of groundwater and surface water quality conditions downstream of the diversion in 2004–2005 (USGS 2006). Groundwater in the project area generally occurs in the Mancos Shale from 1 to 15 feet below ground surface and has high dissolved solids concentrations. Groundwater wells in the study area had dissolved solids ranging from 687 to 55,900 mg/L. The transport of salts (dissolved solids) from agricultural irrigation, concentration from evapotranspiration, and weathering of rocks in the soil are likely sources of salts in groundwater. Existing groundwater rights exist within one mile of the project site; a table listing those rights and uses can be found in the Concept Design Report (Appendix B).

2.2.5. Floodplains

The Federal Emergency Management Agency (FEMA) flood insurance map for the study area (Map 4902320016A [historic, dated 1981]) indicates that the 100-year floodplain extends for approximately 200 feet to 1,000 feet in width along the east side of the Green River (Figure 2-3). The west side in the study area is on BLM property and is not mapped.

2.2.6. Waters of the US including Wetlands

The jurisdictional wetland delineation and waters of the US inventory will be performed in the Spring of 2014. The Preliminary Wetland Inventory memo (Appendix C) was prepared in consultation with the US Army Corps of Engineers (USACE). The studies are conducted to identify and assess waters of the U.S. and wetlands within or adjacent to the study area. Based on the preliminary reconnaissance, waters of the US in the study area can be divided into natural drainages and associated wetlands as well as irrigation-related canals, laterals, and drains.

The Preliminary Wetland Inventory identified 17.88 acres of open waters and 28.19 acres of wetlands within the project area. Data compiled by the National Wetland Inventory (NWI) shows the presence of wetlands along the banks of the Green River (Figure 2-3). According to NWI mapping, there are four distinct wetlands present along the river margin within the immediate project vicinity (NWI 2013). These wetlands are characterized as palustrine, scrub-shrub and temporarily flooded (PSSC). Palustrine systems include non-tidal wetlands of less than 6.5 feet (2 meters) at the deepest point. Scrub-shrub includes woody vegetation less than 19.7 feet (6 meters) tall. Temporary flooding indicates that surface water is present for only brief periods at these wetlands, with the water table typically below the soil surface.

2.2.7. Climate Change

A recent report by the Southwest Climate Alliance (Cayan et al. 2013) described an evaluation of the potential future conditions in the Southwestern U.S. based on the latest climate change models. The key findings include the following:

- Air temperatures in the Southwest will rise by more than 3° F over the next 100 years (high confidence).

- Temperature rise will occur more in summer and fall than in winter and spring (medium-high confidence).
- Climate variations in temperature and precipitation will continue to be prominent (year to year and decade to decade; high confidence).
- There will be lower precipitation in the southern portion of the Southwest region and little change in the northern portion of the region (medium-low confidence).
- There will be a reduction in mountain snowpack over the next 100 years (high confidence).
- Substantial areas of the region will have reduced runoff and streamflow over the rest of the century (medium-high confidence).

2.2.7.1. Local Climate – Utah and the Green River Area

The climate of Utah experiences wide temperature variations between seasons due to its mid-continent location. The climates in Utah also vary greatly depending on the physiologic location and elevation. During winter and spring, temperatures average below freezing and most of the precipitation comes in the form of snow with a deep snowpack accumulating in many of the mountainous high elevations. By late spring, temperatures warm up in the lower valley elevations and the mountain snowpack begins to melt. The high mountain roads and trails are not normally free of snow until mid- to late-June. The summer season brings warm temperatures to most areas in the valleys with hot temperatures in the desert areas. Afternoon thunderstorms become common by June and can be expected into September.

The diversion is located 6 miles northeast of the city of Green River at an approximate elevation of 4,089 feet (above mean sea level). The closest weather station to the diversion structure is at Green River Aviation (Western Regional Climate Center 2012). The area averages a yearly rainfall of 6.45 inches and an average yearly snowfall of 7.7 inches. The average temperature reaches its maximum in July at 97.7°F and its minimum in January at 38.2°F. On average, there are 255 sunny days per year in the area (City Data 2012).

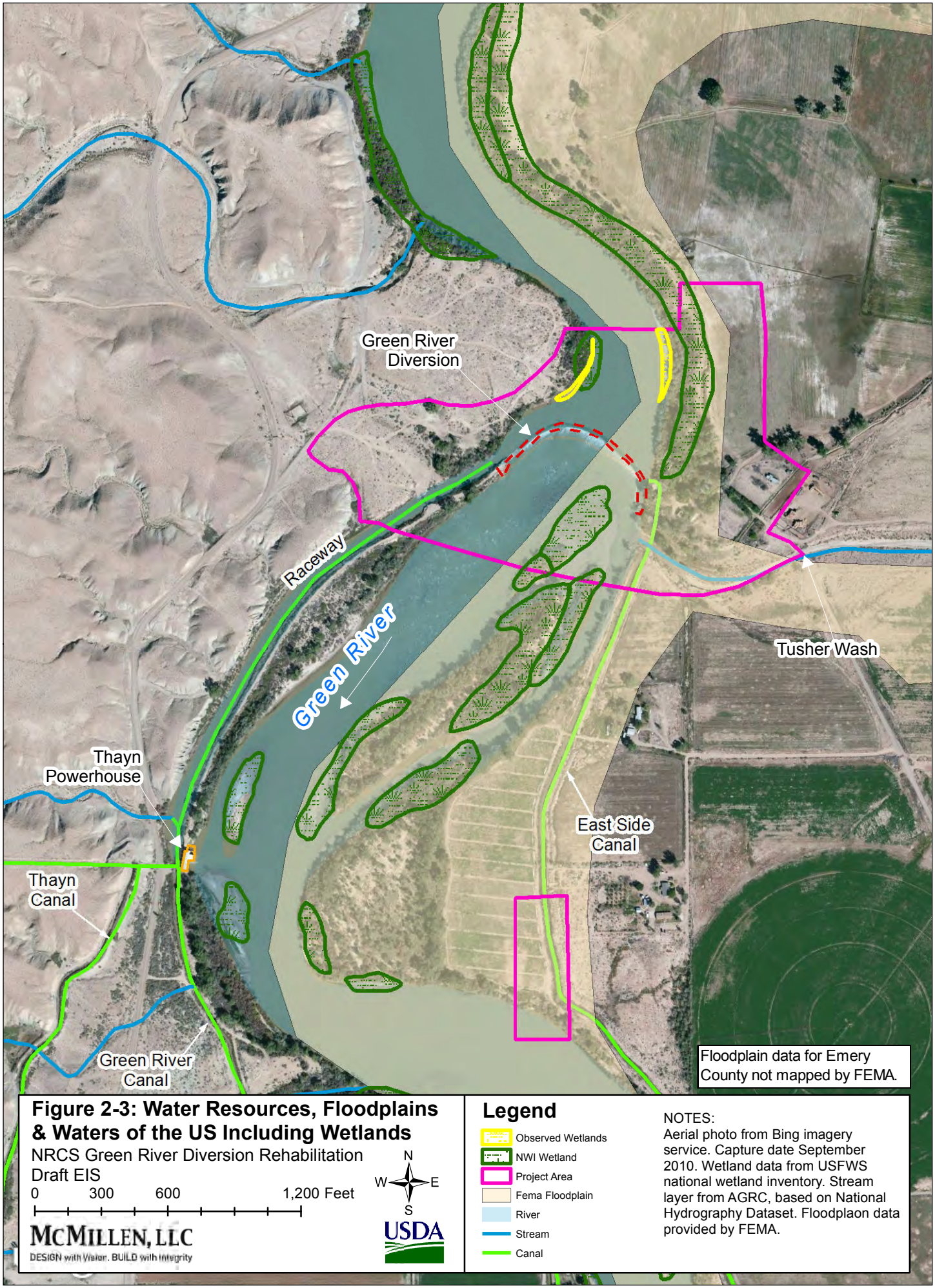

Figure 2-3: Water Resources, Floodplains & Waters of the US Including Wetlands

NRCS Green River Diversion Rehabilitation Draft EIS

0 300 600 1,200 Feet

N W E S

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Legend

- Observed Wetlands
- NWI Wetland
- Project Area
- Fema Floodplain
- River
- Stream
- Canal

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Wetland data from USFWS national wetland inventory. Stream layer from AGRC, based on National Hydrography Dataset. Floodplaon data provided by FEMA.

2.3. Air Quality

2.3.1. National Ambient Air Quality Standards

Pursuant to requirements of the Clean Air Act (42 U.S.C. 7401 et seq.), the U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Monitoring of NAAQS pollutants is conducted in Utah by the Utah Department of Environmental Quality's (UDEQ's) Division of Air Quality (DAQ). The following air quality data are summarized from the 2012 UDEQ air quality report (UDEQ 2012).

NAAQS pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2) and lead (Pb). DAQ has 25 fixed air quality monitoring stations throughout the state of Utah to monitor the NAAQS pollutants. There are no fixed monitoring stations in Emery or Grand counties and the annual report does not include either county in the state nonattainment (exceeds NAAQS) or maintenance areas (historically exceeded NAAQS).

2.3.2. Climate and Greenhouse Gases

Gases that trap heat in the atmosphere are called greenhouse gases (GHG). Data regarding GHGs, regulations, and emissions sources are summarized from EPA (2013). GHGs include CO_2, methane (CH_4), nitrous oxide (N_2O), and florinated gases such as hydroflorocarbons, perflorocarbons, and sulfur hexafluoride. In Utah, emissions inventories are conducted every 3 years.

The Center for Climate Strategies (CCS) prepared a report for UDEQ to evaluate historic and projected GHG emissions in Utah (2005). The CCS report suggested that activities in Utah accounted for about 1% of the total gross GHG emissions in the U.S for the year 2005. However, Utah's gross GHG emissions were reported to be rising faster than those in the rest of the nation; from 1990 to 2005. The CCS report suggested that current trajectories of GHG emissions would result in a 95% increase in emissions from 1990 to 2020. However, the U.S. Energy Information Administration (2013) recently reported that state energy-related CO_2 emissions in Utah had gone down by 1.3% from 2000 to 2010.

2.4. Plants

2.4.1. Vegetation Communities

Vegetation communities present in the area have been mapped by the Southwest Regional Gap Analysis Project (USGS 2005a). Ten discreet communities occur in the general area and five of those communities are immediately adjacent to the river. Table 2-4 summarizes the communities as described in the analysis (USGS 2005b). The five primary communities present in the study area are presented first.

Table 2-4. GAP Analysis Summary

Vegetation Community	Summary
Colorado Plateau Mixed Bedrock Canyon and Tableland	This vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. It occurs on the west bank, both upstream and downstream from the diversion
Inter-Mountain Basins Mixed Salt Desert Scrub	This is a widespread ecological system that includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the western U.S. It occurs on the west bank, both upstream and downstream of the diversion.
Inter-Mountain Basins Greasewood Flat	This vegetation community typically is found near drainages on stream terraces and flats. It occurs in a small area on the west bank, upstream from the diversion.
Invasive Southwest Riparian Woodland and Shrubland	This invasive plant community dominates the land cover along the east bank of the study area from approximately 2,000 feet upstream of the diversion to 200 feet downstream. It also occurs on the west bank upstream of the diversion.
Developed, Medium - High Intensity	These areas have a mixture of constructed materials and vegetation. Impervious surface accounts for 50 to 100% of the total cover.
Inter-Mountain Basins Mat Saltbrush Shrubland	This ecological system is found on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin on Mancos Shale. It occurs at locations over 300 feet from the west riverbank and beyond.
Colorado Plateau Blackbush-Mormon-Tea Shrubland	This vegetation community is characterized by extensive open shrublands with a sparse herbaceous layer composed of grasses. There are two small communities within a few hundred feet of the west bank of the river.
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	This community is typically found within the flood zone of rivers, on islands, sand or cobble bars, stream banks, and irrigation ditches. Patches of this native riparian habitat are in the study area along the diversion canal.
Invasive Annual and Biennial Forbland	A small area of this community on the west bank, downstream of the southern end of the diversion canal.
Agriculture	Agriculture areas occur well upstream and downstream of the diversion and over 500 feet from the east bank.

2.4.1.1. Riparian Areas

Riparian ecosystems are generally defined as those areas adjacent to flowing waterways and standing water bodies that have a distinct plant community different than that of nearby uplands. Riparian plant communities provide essential ecological functions, including stabilization of riverbanks, trapping of nutrients and sediments, buffering flood events, and contributing one of the most diverse and productive habitats available (UDWR 1996). Undisturbed riparian zones are home to a wide range of resident and migratory wildlife and provide refuge from predators and extreme summer heat.

Riparian areas throughout Utah have declined or been degraded through stream diversions, groundwater pumping, and extended drought (Hultine *et al*. 2010.) Where alterations in riparian areas have occurred, non-native and invasive plant species have become established. In particular, tamarisk, Russian olive, and purple loosestrife have spread through the Green River's riparian zones, resulting in substantial

changes to the ecosystem (UDWR 1996). Today, cottonwoods, tamarisk, and willows are the predominant members of the riparian plant community throughout the length of the Green River (State of Utah 2013b).

Protection of riparian ecosystems is essential to biological health of the river, but is also highly valued as a natural area for the people of Utah. The Grand County General Plan reports that county residents identified riparian areas as their top priority for the types of open space preferred for recreation (Grand County 2011).

2.4.2. Endangered and Threatened Species and Species of Concern

There are six Federally-listed threatened or endangered plant species known to occur within Emery and Grand counties and no candidate plant species for listing (Table 2-5). The Biological Assessment (Appendix C; to be completed spring 2014) provides extensive species analysis and survey data, which serve to verify the "presence" findings in the table. Most of these plants occur southwest of the study area in the San Rafael Swell area and southeast in the Moab area at higher elevations and in other soils derived from other parent material than what is found onsite. Based on these facts, it is unlikely that any of the threatened or endangered listed plant species are present within the study area. The BLM, as a Cooperating Agency on the project, has determined that none of the BLM sensitive plants listed in Emery County are likely to be found within the project area (see attached BLM Plant Survey Memo).

Table 2-5. Federally-Listed Plant Species in Emery and Grand Counties, Utah

Common Name	Scientific Name	Status	County	Presence
Barneby reed-mustard	*Schoenocrambe barnebyi*	E	Emery	Not in study area
Bolander's camissonia	*Camissonia bolanderi*	BLM	Emery	Not in study area
Creutzfeldt flower	*Crytantha creutzfeldtii*	BLM	Emery	Not in study area
Cronquist's buckwheat	*Eriogonum corymbosum*	BLM	Emery	Not in study area
Dolores rushpink	*Lygodesmia grandiflora*	BLM	Emery	Not in study area
Green River milk-vetch	*Astragalus pubentissimus*	BLM	Emery	Not in study area
Horse Canyon stickleaf	*Mentzelia multicaulis*	BLM	Emery	Not in study area
Jones' Cycladenia (waxy dogbane)	*Cycladenia humilis var jonesii*	T	Emery, Grand	Not in study area
Last chance Townsendia	*Townsendia aprica*	T	Emery	Not in study area
Jones indigo bush	*Psorothamnus polydenius*	BLM	Emery	Not in study area
Maguire's daisy	*Erigeron maguire*	BLM	Emery	Not in study area
Mussentuchit gilia	*Alicielia tenuis*	BLM	Emery	Not in study area
Psoralea globemallow	*Sphaeralcea psoraloides*	BLM	Emery	Not in study area

Common Name	Scientific Name	Status	County	Presence
San Rafael cactus	*Pediocactus despainii*	E	Emery	Not in study area
Thompson's talinum	*Talinum thompsonii*	BLM	Emery	Not in study area
Trotter's alpineparsley	*Oreoxis trotteri*	BLM	Emery	Not in study area
Utah spurge	*Euphorbia nephradenia*	BLM	Emery	Not in study area
Winkler pincushion cactus	*Pediocactus winkleri*	T	Emery	Not likely in area
Wright fishhook cactus	*Sclerocactus wrightiae*	E	Emery	Not likely in area

This list was compiled by the Utah Division of Wildlife Resources (UDWR) using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS) (UDWR 2012b), as well as the USFWS Environmental Conservation Online System Species by County report for Emery and Grand Counties, UT (USFWS 2013). BLM species (BLM 2011); T=Federally Threatened, E=Federally Endangered.

2.4.3. Invasive Plant Species and Noxious Weeds

Executive Order 13122 states that "a Federal agency shall not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction and spread of invasive species in the U.S. or elsewhere."

There are a total of 27 plant species classified as noxious weeds in Utah (UWCA 2013). Noxious weeds are non-native plant species designated by state law or county ordinance because they cause, or have the potential to cause, extraordinary negative economic and ecological impacts. Of these, 19 are reported to occur in Emery County or Grand County (Table 2-6). Noxious weeds are further divided by their level of invasiveness. Class A noxious weeds have low populations with high priority control potential, Class B weeds have moderate populations that are thought to be controllable in most areas, and Class C weeds are categorized as having extensive cover and are beyond control (UCWA 2013). The focus on Class C species is containment of the existing distribution. Each Utah county may also revise the list per local conditions; Emery and Grand counties both include Russian olive on their lists (Emery County Weed and Mosquito Department 2013 and Grand County Weed Department 2012). In addition to the noxious weeds list, UDWR has developed an invasive aquatic species list of plants, which includes common reed (*Phragmites australis*) in both Emery and Grand counties (2009a).

Noxious weed species that have the potential to occur in the study area are shown in Table 2-6. However, no on-site surveys have been conducted to determine presence or extent of invasive plant species and noxious weeds in the study area. Prior to construction, a plant survey will be completed which will indicate which class A and B weed species inhabit the study area. That information will be utilized to develop a Post Construction Site Rehabilitation Plan. The Plan will include mechanisms for addressing weed establishment and treatment.

Table 2-6. Noxious Weeds and Other Invasive Plants Potentially Present in the Study Area

Common Name	Scientific Name	Statewide Class	County Presence
Purple loosestrife	*Lythrum salicaria*	A	Emery, Grand
Black henbane	*Hyoscyamus niger*	A	Grand
Diffuse knapweed	*Centaurea diffusa*	A	Grand
Leafy spurge	*Euphorbia esula*	A	Emery
Spotted knapweed	*Centaurea maculosa*	A	Emery, Grand
Yellow toadflax	*Linaria vulgaris*	A	Emery
Bermudagrass	*Cynodon dactylon*	B	Emery, Grand
Dalmatian toadflax	*Linaria genistifolia*	B	Emery
Hoary cress	*Cardaria draba*	B	Emery, Grand
Musk thistle	*Carduus nutans*	B	Emery, Grand
Perennial pepperweed	*Lepidium latifolium*	B	Emery, Grand
Poison hemlock	*Conium maculatum*	B	Emery
Russian knapweed	*Centaurea repens*	B	Emery, Grand
Scotch thistle	*Onopordum acanthium*	B	Emery, Grand
Canada thistle	*Cirsium arvense*	C	Emery, Grand
Field bindweed	*Convolvulus arvensis*	C	Emery, Grand
Houndstongue	*Cynoglossum officinale*	C	Emery, Grand
Quackgrass	*Elytrigia repens*	C	Emery, Grand
Salt cedar	*Tamarisk* spp.	C	Emery, Grand
Russian olive	*Eleagnus angustifolia*	-	Emery, Grand

Data compiled from Belliston et al. 2009. Class A noxious weeds have low populations with high priority control potential, Class B weeds have moderate populations that are thought to be controllable in most areas, and Class C weeds are categorized as having extensive cover and are beyond control (UCWA 2013).

2.5. Animals

2.5.1. Fish and Wildlife Habitat

Fish and wildlife in the study area include a wide range of native and non-native fish, migratory birds, resident birds, mammals, amphibians, and reptiles. Fish populations in the lower Green River are dominated by nonnative channel catfish and common carp as well as native bluehead and flannelmouth suckers.. Habitat for the wildlife species is provided by the cottonwood/willow riparian areas along the river margin, the adjacent greasewood habitat, and nearby cliff faces of the Beckwith Plateau. Wildlife populations that are most well documented and understood include those that are listed for protection under the Endangered Species Act (ESA) or those that are desired hunting targets.

The UDWR manages several large game, mammal, furbearer, and bird game species. Available online mapping shows that the study area provides either year-round, winter, or summer range to three of these species. Pronghorn antelope range includes the study area year-round, Chukar partridge are present in the study area during winter, and mule deer are year-long residents in the Green River Valley through the study area (UDCD 2013). Other big game species that have been harvested in adjacent management areas include elk, Rocky Mountain bighorn sheep, cougars (UDWR 2011), and black bear (UDWR 2012). Furbearers caught in Emery or Grand County in the 2012–2013 harvest included beaver, bobcat, coyote, grey fox, muskrat, raccoon, red fox, and striped skunk (UDWR 2013a). Other furbearers not included in harvest surveys that are common in the study area include cottontail rabbit and black-tailed and white-tailed jackrabbit (UDWR 2013b). Upland game birds in the study area include Chukar partridge, ring-necked pheasant, and wild turkey (UDWR 2013c). Ducks, shorebirds, herons, and other waterbirds are also common throughout the waterways of Utah. Neotropical migratory and resident birds are also abundant and dependent on the riparian habitat available. Snakes, lizards, toads, and other reptiles are common near the river.

2.5.2. Endangered and Threatened Species and Species of Concern

Within Emery County or Grand County, there are a total of 36 species that are federally or state listed, species of concern or managed under a Utah Conservation Agreement to preclude listing (Table 2-7). Federally protected species include six endangered (E), two threatened (T), and three candidates (C) for listing. Utah recognizes 22 species within Emery and Grand counties as species of special concern (SPC), including the three federal candidates for listing. There are five species for which UDWR has prepared a Conservation Agreement (CS). Species descriptions and habitat types are summarized below.

Table 2-7. Federal and State Listed Species in Emery and Grand Counties, Utah

Common Name	Scientific Name	Status	County	Likely to Occur in Study Area
Allen's big-eared bat	*Idionycteris phyllotis*	SPC	Grand	No
American white pelican	*Pelecanus erythrorhynchos*	SPC	Grand	No
Bald eagle	*Haliaeetus leucocephalus*	SPC	Emery, Grand	Yes
Big free-tailed bat	*Nyctinomops macrotis*	SPC	Grand	Yes
Black-footed ferret	*Mustela nigripes*	E; Extirpated	Emery, Grand	No
Bluehead sucker	*Catostomus discobolus*	CS	Emery, Grand	Yes
Bonytail	*Gila elegans*	E	Emery, Grand	Yes
Burrowing owl	*Athene cunicularioa*	SPC	Emery, Grand	Yes
Canada lynx	*Lynx canadensis*	T	Emery	No
Colorado pikeminnow	*Ptychocheilus lucius*	E, DCH	Emery, Grand	Yes
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	CS	Emery	No

Common Name	Scientific Name	Status	County	Likely to Occur in Study Area
Cornsnake	*Elaphe guttata*	SPC	Emery, Grand	Yes
Eureka mountainsnail	*Oreohelix eurokensis*	SPC	Grand	No
Ferruginous hawk	*Buteo regalis*	SPC	Emery, Grand	Yes
Flannelmouth sucker	*Catostomus latipinnis*	CS	Emery, Grand	Yes
Fringed myotis	*Myotis thysanodes*	SPC	Grand	No
Gray wolf	*Canis lupus*	E	Emery	No
Great plains toad	*Bufo cognatus*	SPC	Emery	Yes
Greater sage-grouse	*Centrocercus urophasianus*	C, SPC	Emery, Grand	No
Gunnison sage-grouse	*Centrocercus minimus*	C, SPC	Grand	No
Gunnison's prairie-dog	*Centrocercus minimus*	SPC	Grand	No
Humpback chub	*Gila cypha*	E	Emery, Grand	No
Kit fox	*Vulpes macrotis*	SPC	Emery, Grand	No
Lewis's woodpecker	*Melanerpes lewis*	SPC	Grand	No
Mexican spotted owl	*Strix occidentalis lucida*	T	Emery	No
Mountain plover	*Charadrius montanus*	SPC	Grand	No
Northern goshawk	*Accipiter gentilis*	CS	Emery, Grand	No
Razorback sucker	*Xyrauchen texanus*	E, DCH	Emery, Grand	Yes
Roundtail chub	*Gila robusta*	CS	Emery, Grand	Yes
Smooth greensnake	*Opheodrys vernalis*	SPC	Grand	No
Spotted bat	*Euderma maculatum*	SPC	Grand	Yes
Three-toed woodpecker	*Picoides tridactylus*	SPC	Emery, Grand	No
Townsend's big-eared bat	*Corynorhinus townsendii*	SPC	Emery, Grand	Yes
Western toad	*Bufo boreas*	SPC	Emery	No
White-tailed prairie-dog	*Cynomys leucurus*	SPC	Emery, Grand	Yes
Yellow-billed cuckoo	*Coccyzus americanus*	C	Emery, Grand	Yes

This list was last compiled by UDWR (March 29, 2011) using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS), as well as the USFWS Environmental Conservation Online System Species by County report for Grand and Emery Counties, Utah. E=Federally Endangered, T=Federally Threatened, C=Federal Candidate for Listing, DCH=Designated Critical Habitat, SPC=Utah Species of Concern, CS=Species receiving special management under a Conservation Agreement in order to preclude need for federal listing.

2.5.2.1. Federally Listed Fish Species

A recent study prepared by NRCS reviewed the status of federally listed species within the study area, including the Green River just upstream of the diversion and downstream to the city of Green River (2008). The data provided for federally listed fish and wildlife and candidates for listing are summarized from the NRCS report and Campos (2005), unless otherwise noted. Species occurrences data were collected from Utah Conservation Data Center (UCDC) interactive mapping of USGS quads Tusher Canyon and Blue Castle Butte that include the project area, as well as the Butler Canyon quad, which covers the Green River upstream of the diversion (2013). In general, the substantial fish population reductions, and near extinction in some cases, can be traced to changes in flow, habitat loss or alteration, and competition with or predation by exotic fishes. Portions of the Green and Colorado rivers in Utah are designated as critical habitat for the four endangered fish species in the study area (NRCS 2008); consultation has verified that the study area is designated critical habitat for the razorback sucker and the Colorado pikeminnow (Figure 2-4).

BONYTAIL

This fish is an exceedingly rare minnow originally native to the Colorado River (UCDC 2013). In the last decade, few reports of bonytail captures or observations have been made. Their current distribution includes the upper Colorado River basin system and captures have been made in the Green River, Yampa River, and the mainstem Colorado River in Cataract Canyon. The most recent report of bonytail in the project vicinity is in 2006 within the Blue Castle Butte quad (UCDC 2013). In the Upper Colorado River Basin, bonytail are raised at the Ouray National Fish Hatchery, Ouray Unit in Vernal, Utah. Bonytail raised at this facility are stocked in the middle and lower Green River in Utah (Upper Colorado River Endangered Fish Recovery Program 2014), and stocking goals for 2013 included the rearing of 10,000 bonytail. These fish are rare, but have the potential to be present in the study area.

Bonytail reach a maximum size of about 22 inches (55 cm), 0.5 pounds (1.1 kg) in weight, and live to be as old as 49 years. Bonytail prefer backwaters with rocky or muddy bottoms and flowing pools, although they have also been reported to occur in swiftly moving waters. Additional habitat includes flooded bottomland habitats, which are important growth and conditioning areas for juveniles (AGFD 2001). Bonytail adults are largely omnivorous with a diet of terrestrial insects, plant debris, and algae, while young bonytail eat aquatic insects. Spawning occurs in spring over rocky substrates. Natural reproduction of bonytail was last documented in the Green River in Dinosaur National Monument where spawning fish were captured from mid-June to early July at water temperature of 18^{o}C (AGFD 2001).

COLORADO PIKEMINNOW

The Colorado pikeminnow was once common and abundant throughout its native range in both the upper and lower Colorado River basins. The majority of today's population exists in the Green River, Yampa River, lower Duchesne River, White River, Gunnison River, and the main stem of the Colorado River downstream to Lake Powell. A database search carried out for the NRCS study showed that these fish are within the Green River study area, which is considered designated critical habitat.

The largest documented fish weighed in at 34 lbs (15.5 kg) and just under 39 inches (100 cm), although historic accounts estimated a maximum total length of about 71 inches (180 cm) and weight of 79 lbs (36 kg). Adult Colorado pikeminnow use relatively deep, low-velocity eddies, pools, and runs that occur in nearshore areas of main river channels and tend to prefer habitat with high complexity. Adults will also use floodplain habitats, flooded tributary mouths, flooded side canyons, and eddies that are available during high flows. The Colorado pikeminnow is a highly migratory species; adults are understood to travel hundreds of kilometers to and from spawning areas, requiring long sections of river with unimpeded passage. Adults move to spawning areas in early summer and return to home ranges in August and September. Natural reproduction of Colorado pikeminnow is currently known to occur within the Green River in both confined and meandering, alluvial reaches. The Colorado pikeminnow is a warmwater species that requires relatively warm temperatures for spawning, egg incubation, and survival of young. After emerging, larvae drift downstream to nursery backwaters in sandy, alluvial regions. Juveniles remain near nursery areas for the first 2 to 4 years of life, then move upstream and establish home ranges. The primary diet items for juvenile pikeminnow include cladocerans, copepods, and midge larvae, and as they grow, begin to consume insects. In adulthood, these fish are primarily piscivorous.

HUMPBACK CHUB

The humpback chub once inhabited the swift, whitewater areas found in the canyons of the Colorado River and four of its tributaries: the Green, Yampa, White, and Little Colorado Rivers. Today, five self-sustaining populations of humpback chub occur in the Upper Colorado River Basin. Two to three thousand adults can occur in the Black Rocks and Westwater Canyon core population in the Colorado River near the Colorado/Utah border. Several hundred to more than 1,000 adults may occur in the Desolation/Gray Canyon core population in the Green River. Populations in Yampa and Cataract canyons are small, each consisting of up to a few hundred adults. This species may migrate through the area but there are no resident populations; therefore this species is not likely to occur in the project area.

Humpback chub are long-lived, big-river cyprinids that can attain a maximum size of about 19 inches (48 cm) and 2.5 lbs (1.15 kg), and live to about 25 years. The humpback chub evolved in seasonally warm and turbid water and is adapted to the unpredictable hydrologic conditions that once characterized the native Colorado River system. Humpback chub live and complete their entire life cycle in canyon-bound reaches characterized by deep water, swift currents, and rocky substrates. Subadults use shallow, sheltered shoreline habitats, while adults use primarily offshore habitats of greater depths. The humpback chub requires relatively warm temperatures for spawning, egg incubation, and survival of larvae. Spawning occurs from March to May in waters of 60 to 72° F (16 to 22°C). Juvenile humpback chub require slow moving waters in shoreline habitats. Humpbacks are opportunistic omnivores with a diet consisting of insects, crustaceans, plants, seeds, and occasionally small fish and reptiles.

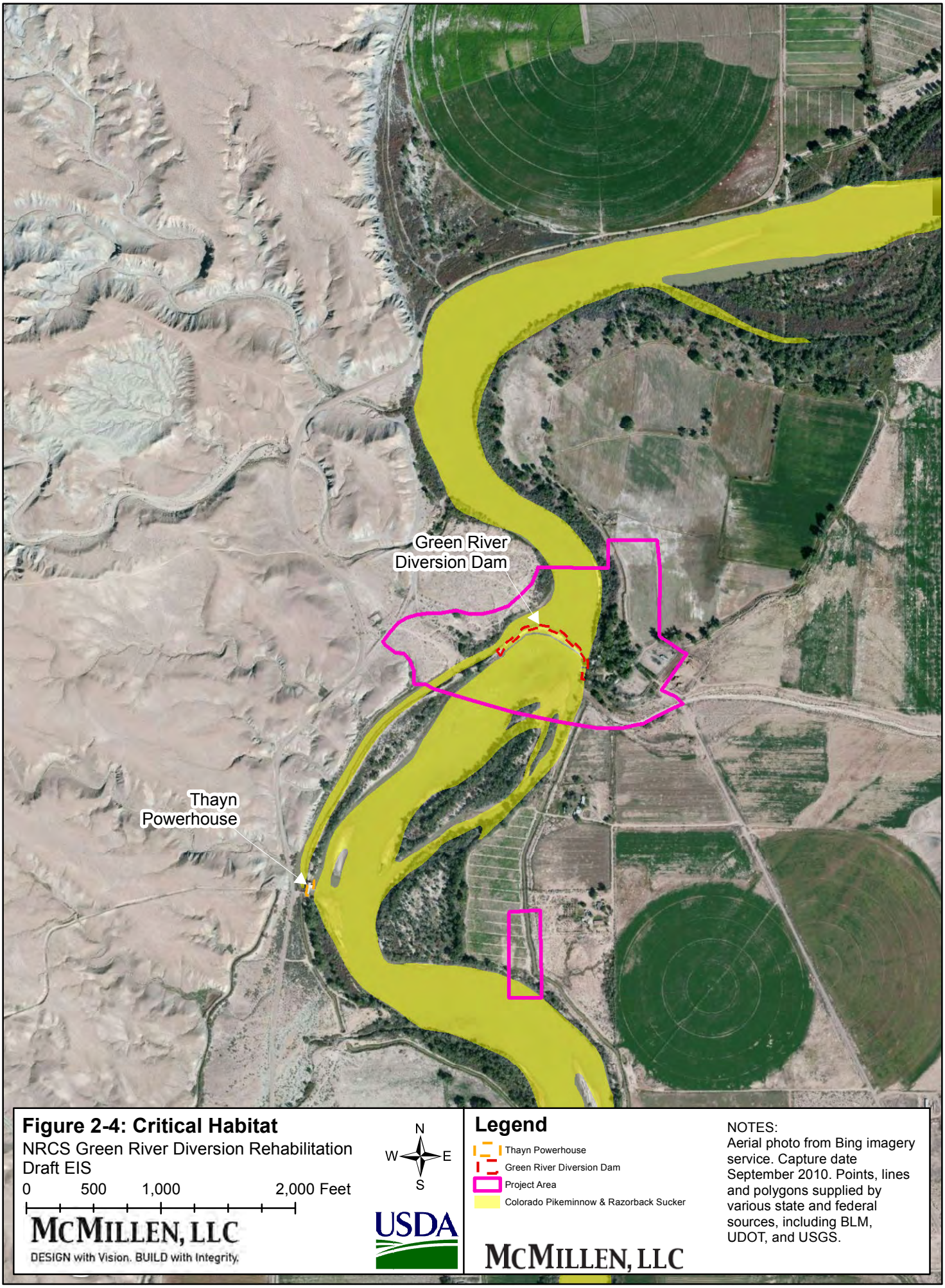

Figure 2-4: Critical Habitat

NRCS Green River Diversion Rehabilitation
Draft EIS

0 500 1,000 2,000 Feet

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McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity.

USDA

Legend

- Thayn Powerhouse
- Green River Diversion Dam
- Project Area
- Colorado Pikeminnow & Razorback Sucker

McMILLEN, LLC

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Points, lines and polygons supplied by various state and federal sources, including BLM, UDOT, and USGS.

RAZORBACK SUCKER

The range of the razorback sucker once extended throughout the Colorado River system but is currently restricted to the upper Green River in Utah, lower Yampa River in Colorado, White River, and occasionally in the Colorado River near Grand Junction, Colorado. Additionally, populations occur in the lower Colorado River Basin in Lakes Mead & Mohave. The NRCS study reported that a database search returned several records of razorback suckers in the study area, which is designated critical habitat. UCDC data show the most recent occurrence was recorded in 2009 upstream in the Butler Canyon quad area.

Razorback sucker are raised in hatcheries and stocked into the Green River, including at the Green River State Park just 4 miles downstream. In 2013, 3,150 were stocked at this location. This fish is likely to occur within the study area.

The razorback sucker is a long-lived river catostomid reaching a maximum age of 44 years and a top size of about 39 inches (100 cm) and up to 15 lbs (5 to 7 kg). Adult razorbacks prefer habitats with deep eddies, backwaters, and flooded off-channel environments during spring, switch to runs and pools often in shallow water associated with submerged sandbars during summer, and may select low-velocity runs, pools, and eddies during winter flows. Spring migrations may be of long distance in the spring, with spawning typically occurring mid-April through June. Spawning occurs over bars of cobble, gravel, and sand substrates during widely ranging flows when water temperatures are typically greater than 57° F (14°C). Juvenile suckers use nursery habitats with quiet, warm, shallow water in littoral zones, backwaters, and inundated floodplains and tributary mouths downstream of spawning bars. The diet of riverine adult razorback sucker consists mostly of immature benthic organisms, and lesser amounts of algae, detritus, and inorganic material. Juvenile fish are similarly opportunistic.

2.5.2.2. Federally Listed Wildlife Species

None of the Federally Listed Wildlife Species presented in the table are likely to occur in the study area.

2.5.2.3. Federal Candidates for Listing

YELLOW-BILLED CUCKOO (CANDIDATE; PROPOSED THREATENED)

The Western yellow-billed cuckoo is a medium-sized bird that has become extremely rare in its historic range. The USFWS considers cuckoo occurring west of the Rocky Mountain crest to be a distinct population segment (USFWS 2011), and as of December 2, 2013, the public comment period is reopened for the proposal to list the western distinct population segment of the yellow-billed cuckoo as a Threatened Species under the Endangered Species Act (ESA). There is also a proposed rule to be published in 2014 to designate critical habitat for this species. The NRCS database search reported one occurrence of a yellow-billed cuckoo being seen and heard near the city of Green River in May 2005. Further, a local scientist is quoted as confirming the presence of cuckoo in the area, but also notes that no breeding population has been observed (NRCS 2008).

The primary threat to the yellow-billed cuckoo is the loss and degradation of habitat, particularly riparian forests. Considerable habitat degradation in the Southwest has been caused by the alteration and displacement of native riparian habitat by tamarisk. Tamarisk alters plant community structure, replacing three or four vegetation layers with one indistinct layer. Tamarisk invasion typically coincides with reduction or loss of bird species associated with cottonwood-willow habitat, including the yellow-billed cuckoo. However, where tamarisk has created riparian areas where none had previously existed, some cuckoos have chosen to nest in this shrub.

2.5.2.4. State Species of Concern

Only the species that could potentially occur in the study area are discussed briefly in this section. Bald and golden eagles are discussed in Section 2.5.4.

BIG FREE-TAILED BAT

The big free-tailed bat occurs throughout the western U.S. and Central America. It prefers rocky and woodland habitats and roosts in caves, mines, old buildings, and rock crevices. Big free-tailed bats are insectivores and primarily feed on moths. They occur along the Green River and may be present in the study area (UCDC 2013).

BLUEHEAD SUCKER

The bluehead sucker, *Catostomus discobolus*, is native to parts of Utah, Idaho, Arizona, New Mexico, and Wyoming. Specifically, the species occurs in the upper Colorado River system, the Snake River system, and the Lake Bonneville basin. In Utah, bluehead suckers have been reduced in numbers and distribution due to flow alteration, habitat loss/alteration, and the introduction of nonnative fishes. Consequently, the bluehead sucker is included on the *Utah Sensitive Species List*. Threats that warrant the species being listed as sensitive by state and federal agencies and that might lead to listing by the U.S. Fish and Wildlife Service as threatened or endangered under the Endangered Species Act of 1973, as amended (ESA), are minimized through implementation of a Conservation Agreement developed between resource agencies (UDWR 2006).

The bluehead sucker is a benthic (bottom dwelling) species with a mouth modified to scrape algae (the primary food of the bluehead sucker) from the surface of rocks. Members of the species spawn in streams during the spring and summer. Fast flowing water in high gradient reaches of mountain rivers has been identified as important habitat for bluehead sucker. The bluehead sucker occurs along the Green River and may be present in the study area (UCDC 2013).

BURROWING OWL

The burrowing owl breeds in the western U.S. and Canada, northern Mexico, and parts of Florida and the West Indies. It winters from the southwestern U.S. into Central America. It typically occurs in open grasslands, but can use other open habitats including golf courses and airports. Its prey is mainly terrestrial invertebrates and small mammals, birds, amphibians, and reptiles. The burrowing owl occurs along the Green River and may be present in the study area (UCDC 2013).

CORNSNAKE

The cornsnake occurs in northern Mexico and the southeastern U.S., but an isolated population is known to occur in eastern Utah and western Colorado. They are typically found near streams and in rocky or forested habitats. Cornsnakes eat small mammals, birds, reptiles, and insects. They are known to occur east of the Green River and could be present in the study area (UCDC 2013).

FERRUGINOUS HAWK

The ferruginous hawk breeds throughout western North America and winters in the western and central U.S. and Mexico. It uses grasslands and shrub steppes in both breeding and wintering seasons. The primary prey is small mammals. It is known to occur in the project area and may be present (UCDC 2013).

FLANNELMOUTH SUCKER

The flannelmouth sucker, *Catostomus latipinnis*, is native to the Colorado River system of the western United States and northern Mexico. In Utah, the species occurs in the main-stem Colorado River, as well as in many of the Colorado River's large tributaries. Flannelmouth suckers are usually absent from impoundments. In recent times, Utah flannelmouth sucker populations have been reduced in both numbers and distribution, primarily due to flow alteration, habitat loss/alteration, and the introduction of nonnative fishes. Consequently, the species is included on the *Utah Sensitive Species List*. Threats that warrant the species being listed as sensitive by state and federal agencies and that might lead to listing by the U.S. Fish and Wildlife Service as threatened or endangered under the Endangered Species Act of 1973, as amended (ESA), are minimized through implementation of a Conservation Agreement developed between resource agencies (UDWR 2006).

Flannelmouth suckers are benthic (bottom dwelling) fish that primarily eat algae, although invertebrates and many types of plant matter are also consumed. The species spawns in streams over gravelly areas during the spring and early summer. Flannelmouth suckers prefer large rivers, where they are often found in deep pools of slow-flowing, low gradient reaches.

GREAT PLAINS TOAD

The Great Plains toad occurs widely across western and central North America. It uses desert, grassland, and agricultural habitats. It is known to occur in the study area and is likely to be present (UCDC 2013).

ROUNDTAIL CHUB

The roundtail chub is a large minnow that occurs in the Colorado River system and is present in the Green River. It occurs in large rivers and uses murky pools near swift water. It spawns in gravel substrates in spring and summer. It is likely to be present in the study area (UCDC 2013). Threats that warrant the species being listed as sensitive by state and federal agencies and that might lead to listing by the U.S. Fish and Wildlife Service as threatened or endangered under the Endangered Species Act of 1973, as amended (ESA), are minimized through implementation of a Conservation Agreement developed between resource agencies (UDWR 2006).

SPOTTED BAT

The spotted bat occurs throughout western North America. The species may be found in deserts, forested areas, and mountains. Roosting occurs in caves and rock crevices. They occur in the study area and could be present (UCDC 2013).

TOWNSEND'S BIG-EARED BAT

Townsend's big-eared bat occurs in western North America. In Utah, it can occur in many types of habitat, but is most commonly found near forested areas. Caves, mines, and buildings are used for roosting. It is known to occur in the study area and could be present (UCDC 2013).

WHITE-TAILED PRAIRIE-DOG

The white-tailed prairie dog occurs in Utah, Colorado, Wyoming, and Montana. They are a burrowing mammal and occur in grasslands, deserts, and shrub steppe. They primarily feed on grasses and bulbs. They are known to occur in the study area and could be present (UCDC 2013).

2.5.3. Invasive Fish and Wildlife Species

Executive Order 13122 states that "a Federal agency shall not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction and spread of invasive species in the U.S. or elsewhere."

In response to the 1996 National Invasive Species Act, UDWR prepared an aquatic invasives management plan in coordination with the Utah Aquatic Invasive Species Task Force (UDWR 2009a). Invasive aquatic animals that may occur in the study area include gizzard shad, mosquitofish, and American bullfrog. The UDWR issued a must-kill order effective January 1, 2013 for the entire Green River for the following species: burbot (not found in this reach of the river), channel catfish, northern pike, smallmouth bass, and walleye. Non-native mudsnails and mussels are also a concern in Utah, but are not currently reported to be within the study area. Species accounts provided below are summarized from UDWR (2009a) unless otherwise noted.

2.5.4. Migratory Birds/Bald and Golden Eagles

Wintering, year-round, or breeding populations of bald and golden eagles have the potential to be present in the study area. These birds are afforded particular protection under two separate Acts of Congress. Under authority of the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. "Take" is defined as any attempt or success at pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting. Migratory Bird Permits must be obtained through the USFWS Migratory Bird Permit Office for any unavoidable violation of the MBTA.

The Eagle Protection Act (16 U.S.C. 668) provides specific protection for bald and golden eagles. The act makes it illegal to take, possess, sell, purchase, barter, or transport any bald or golden eagle, alive or dead,

or any part, nest, or egg thereof. “Take” includes pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing.

Utah is home to one the largest state populations of wintering bald eagles, with more than 1,200 eagles counted in Utah in recent years (UDWR 2009b). According to UDWR, 25 to 30% of bald eagles wintering in the lower 48 states spend the winter in Utah, indicating the value of habitat in the state (2009b). Wintering range includes the study area (UCDC 1999). During winter, bald eagles roost communally in sheltered stands of trees, typically selecting roosts near an open water body. Prior to 1980 there were no records of nesting bald eagles in Utah (CBD 2007). Since 1983, when the first pair successfully reproduced, Utah’s breeding bald eagle population has grown to 11 pairs, recorded in 2007. The Center for Biological Diversity notes that breeding bald eagle pairs were known to be present in Emery and Grand counties. Breeding bald eagles prefer to establish nests in large conifer trees near open water, but will also select cliff faces or ground sites if available (Cornell Lab of Ornithology 2013). Clutches are typically 1 to 3 eggs, incubation lasts 34 to 36 days, and the nesting period can run from 56 to 98 days, typically starting in April. Cottonwood trees along Utah’s rivers, lakes, and reservoirs are considered critical for roost and nest sites (UDWR 2009b).

According to UCDC information, high-value habitat for golden eagles is predicted to be present surrounding the study area (UCDC 1997). High-value habitat includes areas that provide for intensive use by a wildlife species. Golden eagles live in Utah year-round and typically forage in open grassland or shrubland habitat, tending to avoid agricultural areas. Prey primarily includes rabbits, hares, ground squirrels, and prairie dogs. During the breeding season, golden eagles occur primarily in areas of mountain cliffs or canyons. In the west, the golden eagle is often associated with rimrock terrain adjacent to open desert or grassland areas. In Utah, golden eagles nest in grasses, shrubs, pinyon-juniper woodland, and aspen-conifer habitats (Peterson 1988, Bates and Moretti 1994). The nesting season is longer than that of typical birds, with more than 6 months between the time eggs are laid until young reach independence. Nesting begins as early as January, but typically occurs in March or later. Golden eagles typically raise an average of only one young per year, though two young are not uncommon when prey is abundant, and may breed for up to 15 years (Kochert et al. 2002).

2.6. Human Environment

This section describes the socioeconomics; cultural resources; potential for hazardous materials in the area; recreation; public health and safety; visual quality, aesthetics, and scenic beauty; land use; infrastructure; and noise within the project vicinity.

2.6.1. Socioeconomics

The socioeconomic area of consideration surrounding the project area can be assessed on a state, regional, and local scale. For the purposes of this study, socioeconomic condition is presented for the state of Utah, Emery and Grand counties, and the city of Green River. The following sections describe current demographic, employment, income, and economic conditions that have the potential to be affected by rehabilitation of the diversion.

2.6.1.1. Lands and Products

Irrigated cropland represents 94.2 and 98.6 percent of the land in farms in the general vicinity of the project. Table 2-8 lists 2009 statistics on agricultural lands and products in Emery and Grand counties.

Table 2-8. Land and Products Statistics for Emery and Grand Counties

Statistic (2009)	Emery County	Grand County
Average size of farms	-	561 acres
Average value of agricultural products sold per farm	$24,950	$23,145
Average value of crops sold per acre for harvested cropland	$86.89	$301.52
The value of livestock, poultry, and their products as a percentage of the total market value of agricultural products sold	86.94%	66.05%
Average total farm production expenses per farm	$22,086	$25,191
Harvested cropland as a percentage of land in farms	-	4.65%
Irrigated harvested cropland as a percentage of land in farms	94.20%	98.65%
Average market value of all machinery and equipment per farm	$45,261	$35,281
The percentage of farms operated by a family or individual	90.20%	89.36%
Average age of principal farm operators	55 years	54 years
Average number of cattle and calves per 100 acres of all land in farms	-	5.51
Milk cows as a percentage of all cattle and calves	1.96%	-
Vegetables	121 harvested acres	111 harvested acres
Land in orchards	14 acres	80 acres

2.6.1.2. Population

During the 2010 U.S. Census, Utah was home to 2,763,885 people, while Emery and Grand counties had 10,976 and 9,225 people, respectively (Table 2-9; U.S. Census Bureau 2010a). The city of Green River is entirely within Emery County and had a population of 952 people in 2010. Population surrounding the diversion is sparse, with only 114 people in the four nearest census blocks (Census Tract 3 Blocks 2213 and 2172, Census Tract 9765 Blocks 3208 and 3213; U.S. Census Bureau 2010a). Population density in the area of consideration is highest within the boundaries of the city of Green River at 75.5 people per square mile. The state average is 32.5 people per square mile, while Grand and Emery counties have less dense populations at 2.5 people per square mile.

Table 2-9. Population Characteristics by State, County, and City in 2010

Socioeconomic Criteria		U.S.	Utah	Emery County	Grand County	Green River
Total Population		308,745,538	2,763,885	10,976	9,225	952
Gender	Female	156,964,212	1,375,568	5,387	4,579	467
	Male	151,781,326	1,388,317	5,589	4,646	485
Age	Under 18	74,181,467	871,027	3,488	2,118	289

Socioeconomic Criteria		U.S.	Utah	Emery County	Grand County	Green River
	18 and over	234,564,071	1,892,858	7,488	7,107	663
	20-24	21,585,999	226,519	562	463	60
	25-34	41,063,948	445,687	1,440	1,226	107
	35-49	63,779,197	487,306	1,748	1,848	184
	50-64	58,780,854	392,374	2,067	2,127	153
	65+	40,267,984	249,462	1,368	1,251	136

U.S. Census 2010a

While population totals throughout the state and in Emery and Grand counties have grown on average, the population of the city of Green River has declined since the 2000 census (Table 2-10). The 2010 Utah population grew by 23.8% since 2000. In the same period, Grand County grew by 8.7% and Emery County grew by only 1.1%. In contrast, though the city of Green River population has increased since 1990, there has been a 2.1% decline in the past 10 years.

Table 2-10. Past, Current, and Future Population

Population Year	U.S.	Utah	Emery County	Grand County	Green River
Total Population 1990	248,709,873	1,722,850	10,332	6,620	866
Total Population 2000	281,421,906	2,233,169	10,860	8,485	973
Total Population 2010	308,745,538	2,763,885	10,976	9,225	952
Projected 2020 Population	336,031,546	2,990,094	NA	NA	NA
Projected 2050 Population	420,080,587	5,368,567[1]	NA	NA	NA

U.S. Census 2010. Interactive Population Map. [1]Governor's Office of Planning and Budget, 2005 Baseline Projections.

2.6.1.3. Race and Ethnicity

Race and ethnicity data from the 2010 census are provided in Table 2-11. The area of consideration had a greater percentage of whites and a lower percentage of other races than the State of Utah as a whole in 2010. Conversely, the city of Green River population was 21.4% Hispanic, which was a greater percentage than the entire U.S. population at 16.3%. Emery and Grand counties are predominantly white, with less than 10% Hispanic population. Other races in Emery County account for less than 2% of the population and just over 5% in Grand County. Other races in the city of Green River also comprise less than 2% of the population. No data are readily available for race and ethnicity in local census tract blocks.

Populations that may be disproportionately disadvantaged under environmental justice laws include the Hispanic population of the city of Green River and the American Indian or Alaska Native group in Grand County. Detailed description of environmental justice parameters and those populations that qualify is provided in the Chapter 4, Environmental Consequences.

Table 2-11. Population Composition by Race and Ethnicity in 2010

Race	U.S.	Utah	Emery County	Grand County	Green River
White	231,040,398 (74.8%)	237,9560 (86.1%)	10,309 (93.9%)	8,207 (89.0%)	754 (79.2%)
Hispanic	50,477,594 (16.3%)	358,340 (13%)	654 (6.0%)	881 (9.6%)	204 (21.4%)
Two or more races	8,953,620 (2.9%)	75,518 (2.7%)	95 (0.9%)	184 (2.0%)	7 (0.7%)
American Indian or Alaska Native	5,220,579 (1.7%)	32,927 (1.2%)	78 (0.7%)	381 (4.1%)	7 (0.7%)
Asian	17,320,856 (5.6%)	55,285 (2.0%)	38 (0.3%)	77 (0.8%)	5 (0.5%)
Black or African American	42,020,743 (13.6%)	29,287 (1.1%)	26 (0.2%)	29 (0.3%)	3 (0.3%)
Native Hawaiian or Pacific Islander	1,225,195 (0.4%)	24,554 (0.9%)	9 (0.1%)	3 (<.01%)	0 (0%)

U.S. Census Data 2010a, 2010b

2.6.1.4. Employment and Income

Overall, the labor market in Utah has slowly recovered from 2008–2009 recession lows, while conditions have remained poor or worsened in some localities (Table 2-12). Utah's unemployment rate reached a 20-year high of 8.4% in 2009 and had dropped significantly to 4.6% in April of 2013 (U.S. Bureau of Labor Statistics 2013).

Grand County unemployment is seasonally driven, with rates dropping to as low as 2.9% in the summer of 2007 and rising as high as 20.3% in January 2010 (U.S. Bureau of Labor Statistics 2013). This seasonal effect occurs in Emery County as well, but to a lesser degree. Lowest unemployment rates in recent decades occurred in November 2008 when only 2.9% of the labor force was unemployed in Emery County (U.S. Bureau of Labor Statistics 2013). A recent unemployment rate high was reached in January 2011 at 9.7%. The most recent unemployment rate reported for Emery County was 5.8% in April 2013. At the time of this report, the most recently reported unemployment rate for the city of Green River was 4.4% (Find The Data 2013).

Table 2-12. Labor Force Characteristics in 2010

Characteristic	Utah	Emery County	Grand County	Green River
Population 16 years and older	1,948,759	7,843	7257	787
Civilian Labor Force	1,338,755	4,830	4781	464
Employed	1,251,302	4,571	4381	431

Characteristic	Utah	Emery County	Grand County	Green River
Unemployed	87,453	259	400	33
Percent Unemployed	6.5%	5.3%	8.3%	7.1%

U.S. Census Bureau 2010a, 2010b.

The distribution of employment by industry sector is provided in Table 2-13. Annually fluctuating employment rates result from seasonal employment in construction and agriculture, fishing, and hunting in Emery County. In Grand County, seasonal fluctuations are also driven by construction, as well as the seasonal employment for recreational areas. The top employers in Emery County include agriculture, forestry, fishing and hunting, mining, construction, retail trade, educational services, and health care and social assistance. Top employers in Grand County include construction, retail trade, arts, entertainment, recreation, accommodation and food services, educational services, and health care and social assistance. Most residents in the city of Green River are employed in arts, entertainment, recreation, and accommodation and food services.

Table 2-13. Employment by Industry in 2010

Industry Sector	Utah	Emery County	Grand County	Green River
Agriculture, forestry, fishing and hunting, and mining	25,048	785	98	12
Construction	93,672	577	552	38
Manufacturing	134,568	247	101	31
Wholesale trade	35,332	85	155	0
Retail trade	154,277	462	465	72
Transportation and warehousing, and utilities	60,667	397	252	8
Information	28,896	90	124	14
Finance and insurance, and real estate and rental and leasing	84,919	133	201	11
Professional, scientific, management, administrative and waste management services	136,460	161	201	0
Educational services, and health care and social assistance	264,705	929	643	71
Arts, entertainment, and recreation, and accommodation and food services	107,641	261	1,022	131
Other services, except public administration	55,600	181	131	9
Public administration	69,517	263	436	34

U.S. Census Bureau 2010b

Household and per capita income for the area of consideration is provided in Table 2-14. State per capita income has declined from $30,291 since 2008 (U.S. Census Bureau 2010a). Compared to the state of

Utah, the median and mean household incomes throughout the area of consideration are lower overall. Although per capita income is similar throughout Emery and Grand counties in comparison to the state of Utah, the city of Green River per capita income is 72% of the Utah average.

Table 2-14. Median Income in 2010

Characteristic	Utah	Emery County	Grand County	Green River
Median Household Income	$57,783	$50,800	$42,004	$38,750
Mean Household Income	$72,305	$57,454	$51,971	$46,361
Per Capita Income	$23,650	$20,257	$22,135	$16,978

U.S. Census Bureau 2010b

2.6.1.5. Poverty

Poverty statistics are provided in Table 2-15. Poverty levels in Emery County are lower overall than the state of Utah average. In Grand County, the percent total of all people living in poverty is about 2% higher than throughout the state. However, fewer families are living in poverty in Grand County. The number of the city of Green River's families living below the poverty level comprises 22.2% of the total population, while the number of individuals living below the poverty level is 19.1% (U.S. Census Bureau 2010b). This is substantially higher in comparison to the state averages.

Populations that may be disproportionately disadvantaged under environmental justice laws include the substantial population of the city of Green River living in poverty. Detailed description of environmental justice parameters and those populations that qualify is provided in Chapter 4, Environmental Consequences.

Table 2-15. Poverty Rates in 2010

Characteristic	Utah	Emery County	Grand County	Green River
Percent all people living below poverty level	11.4%	8.6%	13.3%	19.1%
Percent people living below poverty level (18 years and older)	10.7%	8.4%	13.3%	13.3%
Percent families living below poverty level	8.3%	7.5%	5.9%	22.2%

U.S. Census Bureau 2010b.

2.6.2. Cultural Resources/Historic Properties

NRCS conducted a cultural and historic resources study for this project (NRCS 2013c) and this section summarizes that report. The Area of Potential Effect (APE) includes 111 acres, which encompasses the existing diversion, the river within 1,000 feet upstream and downstream of the diversion, and lands on

both the east and west sides of the river that could be used for access or staging associated with the proposed construction.

The study area has been inhabited by humans for at least the past 10,000 to 12,000 years. Archaeological sites are widespread in the region and are relatively common and sites include lithic scatters, low-density ceramic scatters, sporadic wickiups, and projectile points. The Euroamerican artifacts such as tin cans, weaponry, and equestrian tack are common as well, as the Green River valley was used by French-Canadian fur trappers in the early nineteenth century. The Utes were the dominant Native American group present at the time of European exploration.

Agriculture and ranching became the dominant economic activity through the early twentieth century. The development of the interstate highway system further provided access to the city of Green River. Currently, the Green River area is primarily an agricultural community, but outdoor recreation and tourist traffic are also important components of the economy.

NRCS conducted a database search and an intensive cultural resources inventory of the APE in 2013 (NRCS 2013c). A total of eight sites were identified within the project area, including the East Side Canal, the Thayn Canal, the Green River Canal, the Tusher Diversion, the Hastings Ranch, one prehistoric lithic artifact scatter with historic trash scatter, one historic artifact scatter, and two rock panels with historic inscriptions. Table 2-16 below identifies the key elements of each of the eight sites and a preliminary determination of eligibility made by NRCS.

Table 2-16. Cultural and Historic Sites in the Study Area

Site Name/ Description	Key Elements	Preliminary Determination of Eligibility
East Side Canal	Headgate and siphon, historic sluice gate	Eligible
Prehistoric lithic scatter/ Historic trash scatter	Chert and chalcedony flakes, fire-cracked rock; historic can and glass debris	Pre-historic artifacts eligible; historic artifacts not eligible
Historic artifact scatter	Historic cans and glass debris, shallow pits, historic road segment	Not eligible
Two rock panels	Rock art panels with historic inscriptions	Not eligible
Thayn Canal	Canal, pumps, pipes	Eligible
Green River Canal	Headgate, earthen canal	Eligible
Tusher Diversion	Broad crest weir structure, west-side raceway, east-side raceway	Eligible
Hastings Ranch	Waterwheels, farmhouse, outbuildings	Eligible

The APE for the proposed action encompasses approximately 111 acres. This includes the main channel of the Green River where rehabilitation work on the existing diversion would be completed, and adjacent land along the eastern and western banks of the river where the staging of equipment and materials would take place. The APE encompasses a larger area than what would be directly affected by the proposed

undertaking. The APE was expanded in order to take into account secondary effects from material staging, heavy equipment operation, construction access, and potential variation in water levels in the Green River resulting from changes in the elevation of the proposed diversion.

2.6.3. Hazardous, Toxic, and Radioactive Waste (HTRW)

Hazardous, toxic, and radioactive waste (HTRW) includes any liquid, solid, gas, or sludge that poses a hazard to human health or the environment because of its quantity, concentration, or physical or chemical characteristics. To determine whether HTRW sites occur within the study area, an online review of hazardous sites was requested from Environmental Data Resources, Inc. (EDR) (EDR 2013). The EDR field check results show that there are no known HTRW sites within the ASTM International established search radius of a quarter-mile from the diversion. Two orphan sites (those sites missing an exact address) are reported as occurring within or near the city of Green River including the Green River Material Site 2 miles south of Hastings Avenue and Book Cliffs Energy Corporation east of the city of Green River. Both of these orphan sites are at distances that are unlikely to affect the study area. EDR data are compiled from Federal, state, and tribal lists of known hazardous sites, as well as additional environmental records websites (EDR 2013). This comprehensive online survey of potential HTRW sites does not certify the current condition or location of named sites and does not verify that potentially hazardous sites are absent from the study area. On-site surveys would be necessary to ensure the lack of potential HTRW sites prior to construction.

2.6.4. Recreation

2.6.4.1. Wild and Scenic River Suitability

Congress created the National Wild and Scenic River System in 1968 to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. The BLM manages and evaluates rivers on BLM lands through the resource management planning process. In accordance with the provisions of the Wild and Scenic Rivers Act, the evaluation is a sequential process: eligibility (inventory); tentative classification; and suitability for inclusion in the National Wild and Scenic Rivers System. The Green River in Utah is considered to be suitable for designation as a Wild and Scenic River in 2 segments upstream and downstream of (and not including) the project area: from Nefertiti Boat Ramp to Swaseys Boat Ramp (an 8-mile stretch considered “recreational”; 3.4 miles upstream of the diversion) and downstream of the project area at the confluence of the San Rafael River (30 miles downstream of the diversion) for 50 miles to Canyonlands National Park (“scenic”).

2.6.4.2. Parks

The state of Utah is home to five national parks, seven national monuments, and numerous other national recreation and historic sites. Each of the recreation areas is operated and maintained by one of the following entities: the National Park Service (NPS), BLM, or the Utah State Parks and Recreation Department of the Utah Department of Natural Resources (UDNR). The city of Green River is located amidst the magnificent recreational opportunities that occur in the local area and in the southern portion of the state. Located between Highway 191 South and Highway 24 South, the city of Green River is the

jumping off point to Arches National Park, Canyonlands National Park, the north side of Glen Canyon National Recreation Area, Goblin Valley State Park, Natural Bridges National Monument, and numerous other recreation areas. Locally, Emery and Grand counties are home to a total of five state parks, including Green River State Park within the city of Green River.

Outdoor recreation is the primary component of Utah's tourism industry. In 2011, tourists spent $6.87 billion in tourism-related activities and the tourism industry employed over 124,000 people (Governor's Council on Balanced Resources 2013). There were 4.8 million visits reported to Utah's state parks in 2011, raising revenue from day-use, camping, golf, and other fees. Skiing provides the greatest boon to Utah's tourism economy, generating over a billion dollars in 2011. The number one employer by percent in Utah is the outdoor/sporting goods industry.

Green River State Park is the closest state facility providing public recreation access. Park amenities include boat launches, lodging, tent and recreational vehicle (RV) camping, restrooms with showers, picnic tables and fire pits, group sites, and a golf course. Features and details for these amenities are described in Table 2-17. Other recreational areas within the city of Green River include local parks and sporting fields. A community center and visitor center are also present and provide additional recreational information for the area.

Table 2-17. Green River State Park Facilities and Services

Facility/Service	Features	Season	ADA	Pets	Permit
Boat launch area	Day-use Cabanas	Spring, Summer, Fall, Winter	Yes	Yes	No
Cabins	Cabins	Fall, Spring, Summer, Winter	Yes	No	No
Docks	Docks				
Drinking Water	Drinking Water	Spring, Summer, Fall, Winter			
Fire pits	Fire pits	Spring, Summer, Fall, Winter			
Golf Course	Golf Course	Spring, Summer, Fall, Winter	Yes	No	Yes
Group	Barbecue Grills	Spring, Summer, Fall, Winter	Yes	Yes	
Group	Campsites - RV	Spring, Summer, Fall, Winter	Yes	Yes	Yes
Group	Campsites - Tent	Spring, Summer, Fall, Winter	No	Yes	Yes
Group	RV- Electric Hookups	Spring, Summer, Fall, Winter	Yes	Yes	Yes
Group Camping	Group Camping	Spring, Summer, Fall, Winter	Yes	Yes	Yes
Group Day-Use	Group Day-Use	Spring, Summer, Fall, Winter	Yes	Yes	Yes
Group Pavilion	Group Pavilion	Spring, Summer, Fall, Winter	Yes	Yes	Yes
Launch Ramp	Launch Ramp	Spring, Summer, Fall	Yes		
Main	RV - Electric Hookups	Spring, Summer, Fall, Winter	Yes	Yes	Yes
Main	Barbecue Grills	Spring, Summer, Fall, Winter			
Main	Campsites - RV	Spring, Summer, Fall, Winter	No	Yes	Yes

Facility/Service	Features	Season	ADA	Pets	Permit
Main	Campsites - Tent	Spring, Summer, Fall, Winter	No	Yes	Yes
Modern Restrooms	Modern Restrooms	Spring, Summer, Fall, Winter	Yes		
Picnic Tables	Picnic Tables	Spring, Summer, Fall, Winter	Yes		
Sewage Disposal Station	Sewage Disposal Station	Spring, Summer, Fall, Winter			
Showers	Showers	Spring, Summer, Fall, Winter	Yes		
Wedding Venue	Wedding Venue	Spring, Summer, Fall, Winter	Yes	No	Yes

Source: Utah State Parks 2013

2.6.4.3. Boating

The Green River was part of the historic John Wesley Powell expedition from the city of Green River, Wyoming to the confluence with the Colorado River near present-day Moab in 1869. The John Wesley Powell River History Museum is located on the east bank of the Green River at 1765 East Main Street and provides exhibits including artwork, a boat room, dinosaurs, a pavilion, a theater with a documentary about the Powell expedition, and a river runner's hall of fame.

Boating on the Green River remains an extremely popular sport. There are no developed recreational facilities within the study area. Paddling the river requires a permit issued by the BLM (portions also require a permit from the Ute Tribe Fish and Wildlife Department) to pass through reaches above the study area in Desolation Canyon. Once boaters leave Desolation Canyon and enter the Green River valley, most pull their boats out of the river on the east side at Swaseys Beach/Boat Ramp (Figure 2-5) and do not float down to the diversion because it is often not navigable. Although, some boaters do float over the diversion and pull out of the river at Green River State Park or keep on floating further downstream. The diversion structure creates a strong current in the river through a gradient glide, instead of a typical diversion drop off, and in most flow levels it is preferable to wet portage over the diversion. During low flows in the river, portions of the diversion become exposed and flows are not desirable for wet portage.

Most rapids from Sand Wash at River Mile (RM) 32 to the diversion at RM 119.7 are Class I or II, with six rapids classified as Class III. Higher classifications could occur during extreme high flows. Optimum paddling occurs from mid-spring through late fall, but may be shorter or longer depending on snowmelt conditions in the spring and ice formation in the fall. Green River State Park is a popular place to pull out of the river after paddling from points upstream.

2.6.4.4. General Recreation

Land around the site is federally managed on the west and privately owned on the east with no developed amenities. However, it is possible that recreationists may approach the site from the public land managed by the BLM on the west bank to hunt, fish, or appreciate nature (see land ownership, Figure 1-3). Recreational fishing is regulated on the Green River by the Utah Division of Wildlife Resources (UDWR). Nonnative channel catfish and common carp as well as native bluehead and flannelmouth

suckers are known to populate the project area. Within recent years, big game and other mammals hunted and/or harvested in the management units that include the study area included mule deer, elk, pronghorn, Rocky Mountain bighorn sheep, cougar, black bear, beaver, bobcat, coyote, gray fox, muskrat, raccoon, red fox, and spotted skunk (UDWR 2013). Upland game birds, turkeys, and waterfowl are also popular hunting targets in the area.

In 2009, Utah Governor Jon Huntsman Jr. certified the Statewide Comprehensive Outdoor Recreation Plan (SCORP), which represented a team effort among state entities to compile recreation data and public opinion about recreation in Utah. This report is intended to provide a review of the recreation available to the people of the state, as well as their perceptions of its quality and availability. The diversion rehabilitation study area is within the portion of the state grouped together as the Southeastern planning district.

According to the SCORP, citizens in the Southeastern planning district reported the highest participation in recreation activities such as walking for pleasure or exercise, picnicking, camping, wildlife or bird watching, and running. Other popular activities included fishing, playground activities, and off-highway vehicle (OHV) riding. Recreation facilities that were considered of high importance in this district included camping areas, natural areas, city parks, OHV riding areas, and playgrounds. Overall, residents within the Southeastern planning district were highly satisfied with the availability of city parks, natural areas, ball fields, camping areas, playgrounds, and OHV riding areas.

Figure 2-5: Recreation
NRCS Green River Diversion Rehabilitation
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2.6.5. Public Health and Safety

The diversion itself is located in both Emery and Grand counties. Public health and safety services, including law enforcement, fire protection, health care, and emergency services, are provided to the project area by facilities in the nearby city of Green River, which is located in Emery County. This section provides an overview of the organizations and facilities that service the project area, as well as the current public health and safety conditions. A summary is provided in Table 2-18.

Law enforcement services for incidents that occur on the west side of the Green River and within the city of Green River, are provided by the Emery County Sheriff's office, while those that occur on the east side are under the jurisdiction of the Grand County Sheriff's office. However, the nearest law enforcement offices are located in the city of Green River and are operated by the Emery County Sheriff. In addition, the Utah Department of Safety Highway Patrol maintains an office in town; this facility provides law enforcement response to incidents occurring on the interstate highway system. Incidents occurring in Grand County are serviced by law enforcement located in Moab, Utah, approximately 60 miles and over 1 hour away.

In the event of a medical emergency call to 911, the Emery County Ambulance Medical Control Doctor would determine the nearest facility appropriate for emergency treatment services. The nearest emergency treatment facilities to the project area are present in town, which would be reached via ambulance. If local emergency facilities cannot provide adequate treatment, the medical control service may direct an ambulance or life flight to a more distant facility in the city of Price. Grand County Emergency Medical Services would provide emergency response ambulances or life flight to incidents occurring on the east side of the Green River. The nearest fire station is in town, and wildfire response is dispatched by the Moab Interagency Fire Center.

Table 2-18. Public Health and Safety Services and Facilities in the Project Area

Service	Office	Address	Phone Number
Law Enforcement	County Seat Emery County Sheriff	P.O. Box 817 Castle Dale, UT 84513	(435) 381-2404
	Local Office Emery County Sheriff	80 Farrer Street Green River, UT 84525	(435) 564-3431
	Grand County Sheriff	25 South 100 East Moab, UT 84532	(435) 259-8115
	Utah Department of Public Safety Highway Patrol	420 East Main Street Green River, UT 84525	(435) 564-3474
Fire Protection	Green River City Fire Department	P.O. Box 66 Between Cherry Street, Green River Avenue and W 200 S Street. Green River UT 84525	(435) 564-3229

Service	Office	Address	Phone Number
	Moab Interagency Fire Center	70 E Fire Center Dr. Moab, UT 84532	(435) 259-1850
Health Care	Green River Medical Center	585 W. Main Street Green River, UT 84525	(435) 564-3434
	Castleview Hospital	300 Hospital Drive Price, UT 84501	(435) 637-4800
Emergency Services	Emery County Ambulance	PO Box 907 75 East Main Street Castle Dale, UT 84513	(435) 381-3577
	Grand County Utah Emergency Medical Services	125 East Center Street Moab, UT 84532	(435) 259-1301

2.6.6. Visual/Aesthetics and Scenic Beauty

Aesthetic conditions of the project area can be assessed both spatially and temporally, as visual quality changes over landscape scale and with the seasons. Visitors to the area include adjacent homeowners, local Green River area residents, and recreationists passing through the study area via land or water.

As part of the Colorado Plateau in the desert southwest, the study area is rich in stark contrasts. Gently undulating lowlands through the Green River Valley give way to the abrupt rise of table mesas and rocky buttes that characterize the Beckwith Plateau to the west, north, and east of the study area (Picture 2-1). Dominating the horizon to the west of the project area are Blue Castle and Battleship Buttes, while Gunnison Butte rises to the north. Tusher Wash comprises the lowland elevations to the east.

During summer, grasses, shrubs, and trees create a green ribbon along the river margin, separating the blue of the river from the tan of the rising plateau (Picture 2-2). Riparian vegetation is most abundant and provides the visual softening of the river valley during summer with native species of cottonwood and willow. Tamarisk and Russian olive are also present in the study area. These non-native species have the potential to substantially compromise the visual quality of the vegetation with dense monocultures. During winter, the primarily deciduous trees of the riparian zone lose their leaves and the green margin of the river disappears (Picture 2-1). Snow may cover the landscape and ice forms on slower-moving portions of the river.

The river is wide and sinuous upstream and downstream of the diversion. At lower flows, cobble bars and debris are exposed in the middle of the river, along with the diversion and appurtenant structures. The diversion is a concrete structure extending in an arc across the river in an east to west alignment. Diversion structures, canals, and a waterwheel are all part of the visual character of the site (Pictures 2-1, 2-2, and 2-3). Recent flood events caused substantial damage to the diversion and cracks in the structure are now visible (Picture 2-4).

Picture 2-1. Looking Northwest Toward Beckwith Butte

Diversion structure in foreground during winter season.

Picture 2-2. Looking North Northwest across Diversion Structure

Summer season.

Picture 2-3. New and Old Water Wheel at the Hastings Ranch, East Side

Picture 2-4. Damaged Diversion Structures, East Side

2.6.7. Land Use

The Green River is located in Emery and Grand counties and provides most of the irrigation water used in the area. The study area is comprised of several different land covers. On the west bank of the Green River in Emery County, land immediately adjacent to the diversion is primarily categorized as salt desert shrubland (UACD 2012) managed by the BLM. Within this category is a small area that has been highlighted as being dominated by invasive plants. To the north and south of the diversion, remaining land in the study area is categorized as agricultural. All agricultural land in the study area is in cropland.

Land ownership (Figure 1-3) through the study area is divided among private land holders, public lands (BLM), and Utah School and Institutional Trust Land (UACD 2011, 2012). On the west bank, BLM manages the land immediately adjacent to the diversion. Institutional Trust Land is present south of the BLM land near the control gate, and private land is south of that. Private land is also present on the west bank to the north of the BLM land. On the east bank, land is almost entirely in private ownership. A small pocket of Institutional Trust Land is present, but does not border the river. The State of Utah, Division of Forestry, Fire, and State Lands, by virtue of its sovereignty, owned the bed of the Green River below the ordinary high water mark at statehood in the project area. A Special Use Lease would be required for construction activities and structures located in on the bed of the river.

2.6.8. Infrastructure

The diversion and appurtenant structures include the concrete sloped crest weir diversion, control gate on the west side of the diversion, concrete diversion structure, and East Side Canal that diverts flows to the water wheel, Thayn Canal on the west with a control gate that leads water to the hydropower plant, and the Green River Canal that branches from the hydropower plant via a control gate (Alpha Engineering Company 2010). Prior to damage caused in the 2011 flood event, the stakeholders had identified a number of deficiencies with the diversion including deterioration, sediment loading, inability to meet water right diversions, flooding, loss of habitat, and limitations to recreation.

Transportation to the study area is provided via Interstate 70, whether approaching from the east or west by vehicle, and is the primary arterial conveying traffic. From the east, vehicular traffic exiting off I-70 at Exit 164 takes an 8-mile trip to arrive at the study area. Traffic turns onto State Highway 19 (UT-19) or East Main Street and then turns north onto Hastings Road, which provides access to the land held in private or federal ownership to the east of the Green River. From the west, traffic takes Exit 160 from I-70 to reach UT-19 going east. Traffic then takes a turn north on North Long Street. After approximately 5 miles, the paved road gives way to loose gravel for the final mile. Unpaved roads on BLM-owned land provide access to the west side of the Green River.

Railroad passenger travel is provided by Amtrak along the Union Pacific-owned tracks (Amtrak 2012). The California Zephyr is the only national passenger train moving through Utah and provides twice daily service between Chicago, IL and the San Francisco Bay area. The Green River station is at 250 South Broadway. In the 2012 fiscal year, this train recorded 2,478 boardings at the Green River Station (Amtrak 2012). Also in 2012, a new shelter was built with benches and lighting.

Green River Municipal Airport (Airport U34) is a general aviation facility located 4 miles southwest of the city of Green River and is the nearest airport serving the study area. It is owned by Green River City Corp (FAA 2013). Salt Lake City International Airport is 182 miles away and provides the nearest commercial and international air service.

Utilities providers in the project area include Amerigas and BlueBoX Phone Labs (Google Maps 2013). Aerial photography shows that a utility line passes over the Green River directly above the diversion.

2.6.9. Noise

Applicable noise laws for the project area are provided in the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.), amended by the Quiet Communities Act of 1978 (42 U.S.C. 4913), which promotes the development of state and local noise control programs. The State of Utah has not developed a statewide noise law and Emery County has not developed a countywide noise ordinance. Grand County Land Use Code (LUC) noise laws restrict noise from specific activities, such as mining, but does not set noise level limits (Grand County 2008). The Zoning Ordinance of the City of Green River states generally that it has been designed to protect residents from noise and other objectionable conditions (City of Green River 2012). However, no noise level limitations are defined in the ordinance. Ambient noise in the project area has not been measured, and therefore no baseline is available, although the only noise sources in the study area would be naturally-derived sounds such as the river, birds, insects, and animals; agricultural equipment and pumps for irrigation; occasional vehicle traffic; and recreational users.

Noise-sensitive receptors are those facilities, land areas, or wildlife populations that require lower noise levels for health and function. Examples include residential neighborhoods, medical facilities, schools, churches, research facilities, parks, and open space.

Noise-sensitive receptors within the immediate project area include residential homes. However, the only home within the immediate area is not currently occupied. The nearest noise-sensitive receptors are residential structures located south of the diversion and along the east side canal more than 0.5 miles away.

CHAPTER 3. ALTERNATIVES

3.1. Formulation Process

The process of formulating alternatives for rehabilitation of the diversion followed procedures outlined in the NRCS National Environmental Compliance Handbook (USDA NRCS 2011). Numerous alternatives were developed by the project team based on the ability to address the purpose and need of the project. Some of the initial alternatives were eliminated from further analysis due to high cost or other critical factors. The project team developed a series of questions and filters to help formulate alternatives:

- *Initial Screening Questions:*
  - Does the concept/alternative meet purpose and need?

Several alternatives were eliminated from further study upon the application of the initial screening question. A baseline alternative was developed at this stage of the process to demonstrate rehabilitation of the diversion.

- *Secondary Post-Scoping Screening Filters:*
  - Is it consistent with established design criteria, engineering practices, etc.?
  - Is it reasonable and feasible, and within the established NRCS EWP scope of work and funding allocation?

3.2. Alternative Concepts and Options Considered but Eliminated from Detailed Study

A range of alternatives and options was considered for study early in the project scoping phases. As listed in Section 1.4.2 of this document, project components were identified through agency and public scoping efforts. Initial analysis included the following general types of diversion alternatives, but most were eliminated from detailed study because they did not meet the purpose and need, were considered infeasible, would not be consistent with established engineering practices or NRCS design criteria, or were deemed too costly for the project. The range of eliminated alternatives are listed below; further description and detail for each can be found in Table 1-2 of the Concept Design Report (Appendix B):

- Stoplog Dam
- Dam at Canyon Outlet
- Bladder Weir
- Straight Concrete Diversion
- Downstream Arcing Diversion
- Riprap Ramp
- Rock Weir Series
- Riprap Ramp Series
- Far Upstream Diversion
- Decommissioning, Pumping, and Buyout
- Low Diversion and Buyout
- Water Park Style Diversion
- Replace Alternatives with Hastings Berm Improvement
- Replace Alternatives with Hastings Field Drain Outlet
- Replace/Rehabilitate Diversion
- Repair Diversion In Place
- Replace Diversion Upstream or Downstream

3.2.1. Conceptual Alternatives

The questions of how to rehabilitate the existing structure and also meet the project purpose and need were the initial factors in conceptual alternative development. The following general alternative concept types were the baseline for all others that have been analyzed as part of the process.

3.2.1.1. Dam Decommissioning

Complete removal of the diversion (dam) would entail the excavation and disposal of the entire concrete diversion and reclamation of the river channel and banks to match existing contours. A new stable channel would allow unobstructed flow through the upstream and downstream reaches of the Green River. Complete removal of the diversion would not allow any water to be diverted for irrigation purposes, and would also involve the buyout of the Thayn Hydropower plant. The elimination of water diversion altogether does not meet the purpose and need for this federally funded project and supplemental methods would be required to acquire the same water volume as allotted by water right. The cost estimate for acquiring new water sources (new wells, water purchase, new dam, etc.) and the buyout would cost between $10,000,000 and $15,000,000. Therefore, the dam decommissioning concept was eliminated from detailed study.

3.2.1.2. Replace Diversion Far Upstream or Downstream

Complete diversion removal and replacement far upstream or downstream in a different location would entail the excavation and disposal of the entire concrete diversion and reclamation of the river channel and banks to match existing contours. A new stable channel would allow unobstructed flow through the upstream and downstream reaches of the Green River. The project would also involve the construction of new canals and laterals to provide water to the East Side and Green River canals, as well as the buyout of the Thayn Hydropower plant. Complete removal of the diversion would lower the water surface at the existing location, rendering the Hastings Water Wheel unusable. Connecting the diversion to the existing canals would require canal connections which, depending on the structure's distance upstream, could be prohibitively expensive. The project footprint would be substantially larger, potentially impacting environmental resources. Supplemental methods would be required to acquire the same water volume as allotted by water right. The cost estimate for constructing connections to water conveyances would be prohibitively expensive. Therefore, the replace far upstream or downstream concepts were eliminated from detailed study.

3.2.1.3. Replace Diversion with a Different Structural Type or Shape

Replacement diversion types assessed were of a stop-log type, bladder weir, riprap stepped channel, or a different shape such as straight or downstream arc. While some of these types would provide irrigation to water users and could provide adequate fish passage, disadvantages such as higher operation and maintenance demands; increased bank instability and scouring; vegetation losses; and a high risk of vandalism rendered these eliminated from further study.

3.2.1.4. Rehabilitate or Replace Diversion

The existing diversion structure has been operated and maintained in its existing form and location for over 80 years. This design would divert water to the canals and include components for fish and boat passage. Operation and maintenance could be similar to what is currently done and would allow for improvement in terms of efficiency. Therefore, the rehabilitate or replace diversion (in the same location) concept was carried forward to be analyzed. This concept was expanded into the alternatives evaluated as part of this process.

3.3. Proposed Action

Based on the screening of the range of alternatives that accounted for water right delivery, engineering practicability, environmental impacts, and public and participating agency input, the Proposed Action is recommended (the "preferred alternative" will likely be a combination of the components, and will be decided upon in the Final EIS). The Proposed Action is a list of alternative components that were favored by the public, cooperating and participating agencies.

The Proposed Action would rehabilitate the Green River Diversion, which is necessary due to damage caused by past flood events; upgrade the diversion infrastructure to current design standards; maintain the level of water delivery to the existing water rights holders; and, comply with applicable Federal rules and regulations. The Proposed Action would maintain existing functions of the diversion for water delivery to water rights holders, thereby meeting the Project Purpose and Need.

The Proposed Action is presented in this Chapter as two different alternatives that include some or all of the following component concepts (see Figures 3-1 through 3-3):

- Replace existing diversion structure.
- Raise the structure 1 foot for water delivery to irrigation systems and provide sufficient water for bypass flows at fish protection systems
- Move sediment through the system and maintain floodwater conveyance.
- Replace existing gate and bridge at west raceway and provide sufficient water for bypass flows at fish protection systems.
- Improve east side raceway to water wheel.
- Reinforce the diversion structure with riprap.
- Dredge the large deposition area at the mouth of Tusher Wash for a source of cobble and gravel during construction.
- Construct a new siphon intake at the east side canal.
- Install deflection log booms at the east and west ends for public safety and structure protection.
- Provide upstream fish passage past diversion structure.
- Provide downstream fish passage via notches in the diversion structure.

- Provide passive integrated transponder (PIT) tag detectors to sense and record fish movement over and around the diversion.
- Install fish screen and bypass at the east side canal.
- Provide both dry and wet downstream boat passage past the diversion structure.
- Install boater warning signs upstream of the diversion for public safety.

Emergency watershed protection measures must adhere to all applicable Federal, State, Tribal, and local laws and regulations. The fish passage components are required by the Endangered Species Act. The boat passage components are a navigation requirement of the state. The following lists the water rights and flow allocations for the Proposed Action:

Hydropower – 600 cfs
Irrigation – 235 cfs
Downstream Boat Passage – 150 cfs
Fish Barrier Return Flow – 50 cfs
Downstream Fish Passage – 40 cfs
Upstream Fish Passage – 30 cfs
Fish Screen Return Flow – 20 cfs

3.4. Alternatives Analyzed

Two Action Alternatives have been carried forward by NRCS and the project team to be analyzed in detailed study for this DEIS. In accordance with NEPA, the No Action Alternative must also be analyzed.

The NRCS NEPA manual states that the EIS should identify the agency's preferred alternative. A preferred alternative is the alternative that the lead agency (NRCS) believes would fulfill its statutory mission and responsibilities considering economic, environmental, technical, and other factors (46 Federal Register [FR] 18026). The preferred alternative will be presented in the Final EIS.

3.4.1. No Action Alternative

The No Action Alternative would consist of using no Federal money to rehabilitate the Green River Diversion. Due to the cost associated with the rehabilitation of the diversion, it is likely that no repairs would be made by the stakeholders to the severely damaged structure; it would not be upgraded to current engineering standards and technology, and would provide very limited fish passage and no boat passage. The sediment control/sluice gates would also remain in their current condition. This alternative, therefore, represents the scenario in which the diversion may likely fail during an extreme flood event in the future.

3.4.2. Replace In Place Alternative

This baseline alternative (Figure 3-1) would replace the diversion dam at the same historic location as the existing diversion. The diversion structure or "weir" length would remain the same as the existing. The rehabilitate alternative would maintain the existing east side and west side tie-in locations to the bank, where feasible. The alternative would upgrade the structure to current engineering standards and technology. The 750-foot, arc-shaped crest of the weir would be 1 foot higher and would raise the water

surface elevation 1 foot; which would ensure delivery to water users (Figure 3-2). This alternative would include one new gate for water control and sluicing; and a new bulkhead gate structure and 80-foot raceway to the water wheel on the east side at the Hastings Ranch to maintain existing water rights. As part of the diversion rehabilitation, all existing water rights would be maintained.

On the west side of the diversion, the Green River Canal and powerhouse raceway would be controlled by the existing gate bridge/structure. To reduce debris collection and as a safety measure, two deflection log booms would be positioned across the raceway entrance. The 100-foot long west side and 170-foot long east side log booms would tie into a sluice gate in order to pass the debris past the weir and avoid blockages. At the east side, a new siphon intake for the East Side Canal would be constructed.

Downstream fish passage across the diversion would not be provided by this alternative. Upstream fish passage would be restored to pre-2011 flood conditions on the east side of the structure.

The diversion structure itself would be designed for safe passage over the diversion by boats during passable flows by creating a gradual slope that does not form an eddy that could trap boaters underwater. Boater warning signs would be placed at locations above the diversion on both banks.

This alternative would also require the temporary use of approximately 5.5 acres of BLM-managed public lands, 14.5 acres of state sovereign lands (Green River itself), and 2.3 acres of private lands for staging and access during construction (Figure 3-5).

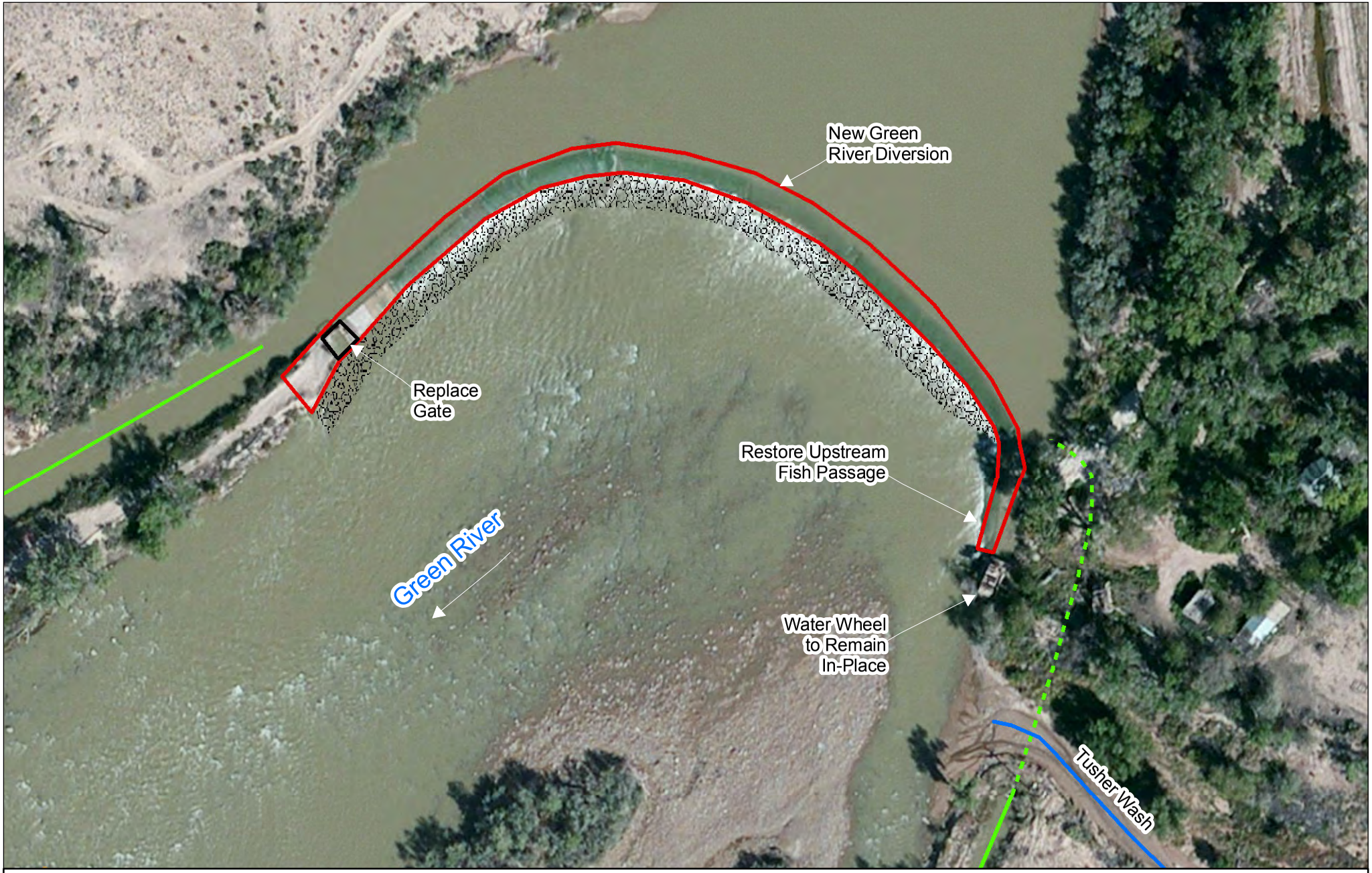

Figure 3-1: Replace In-Place Alt.

NRCS Green River Diversion Rehabilitation
Draft EIS

0 50 100 200 Feet

Legend

- Canal
- Stream
- Subsurface Canal
- Riprap
- New Green River Diversion

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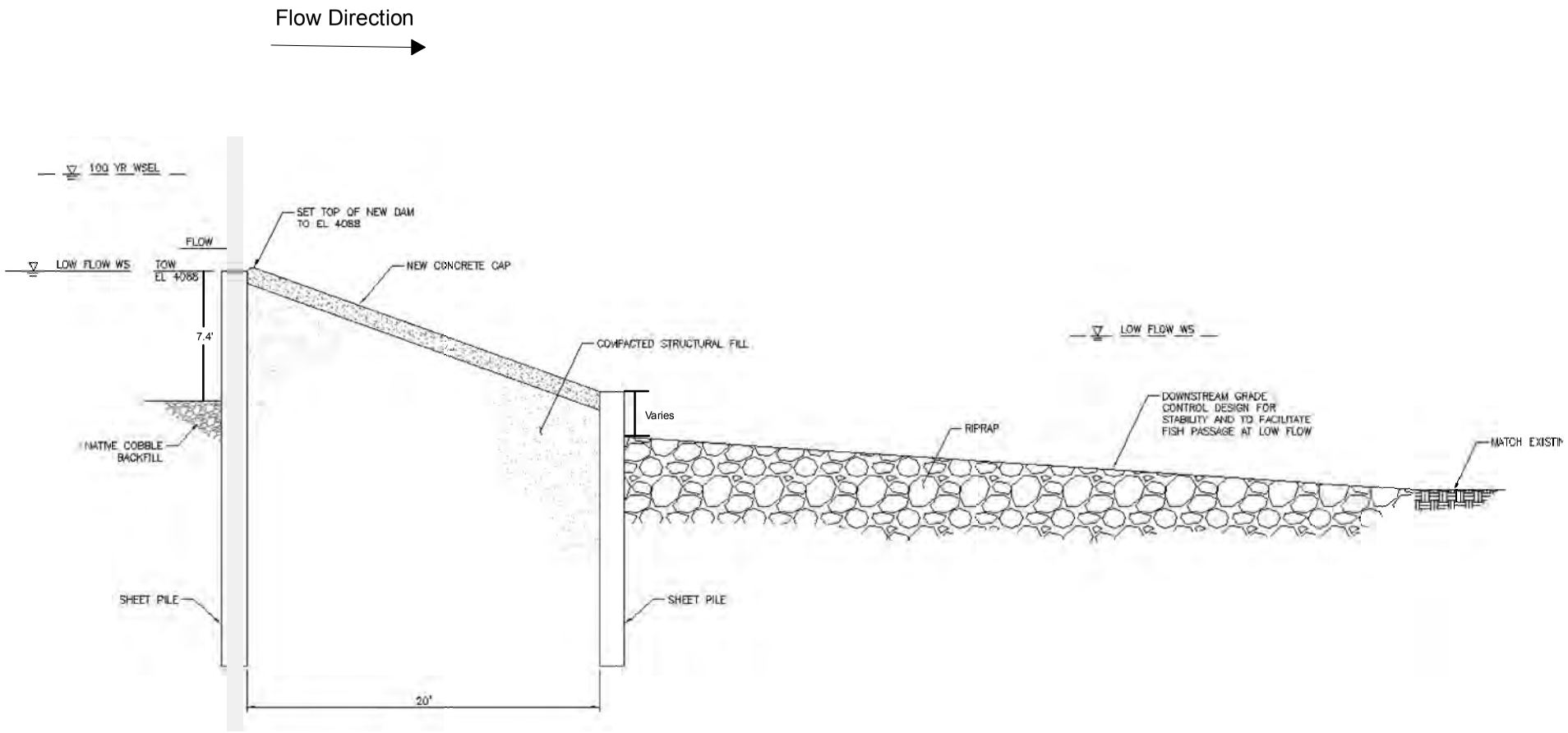
NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Water Rights diversion data from Utah Division of Water Rights(2013). Stream layer from AGRC, based on National Hydrography Dataset. Plan features are approximated and not to scale or defined as final plan.



Not to Scale

Figure 3-2: Replace In-Place Diversion Cross-Section

NRCS Green River Diversion Rehabilitation
Draft EIS

NOTES:
Cross-Section from McMillen, LLC Concept Design dated March 7, 2014. Plan features are approximated and not to scale or defined as final plan.

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3.4.3. Replace In Place With Passages Alternative

This alternative (Figure 3-3) would demolish the existing diversion and install a new diversion in the same historic location. This alternative would replace the existing diversion along the current alignment and upgrade the structure to current engineering standards and technology. The 750-foot, arc-shaped crest of the weir would be 1 foot higher and would raise the water surface elevation 1 foot; which would ensure delivery to water users (Figure 3-2). This alternative would include two new gates for water control and sluicing; and a new bulkhead gate structure and 80-foot raceway to the water wheel on the east side at the Hastings Ranch to maintain existing water rights.

On the west side of the diversion, the existing gate structure would be replaced to provide more efficient water control and sluicing capabilities for the Green River Canal and powerhouse raceway. To reduce debris collection and as a safety measure, two deflection log booms would be positioned across the raceway entrance. The 100-foot long west side and 170-foot long east side log booms would tie into a sluice gate in order to pass the debris over the weir and avoid blockages. At the east side, a new siphon intake for the East Side Canal would be constructed.

Downstream fish passage across the diversion would be provided along the length via notches in the structure. Adjacent to the water wheel raceway would be an upstream fish passage channel (10 feet wide and approximately 180 feet in length) that would be designed to accommodate fish during low flows (Appendix B). Passive integrated transponder (PIT) tag detectors would be placed at each downstream fish passage notch and at the entrance/exit of the upstream fish passage to sense and record fish movement over and around the diversion. A fish screen would be placed in the East Side Canal near the river, with passage back to the river (Figure 3-4). All concentrated fish passage areas would have PIT tag detectors to estimate population movement and numbers.

Boat passage components (Appendix B) would provide additional debris removal benefits. This notch in the diversion structure could be located at either the center or adjacent to the upstream fish passage and the water wheel raceway on the east side (refer to Appendix D for supporting documentation regarding the proposed locations of the boat passage). The boat passage section would consist of a stepped opening 30-feet wide by 2-feet deep in the diversion with a more gradual slope into the tailwater of the diversion to provide safer rafting over the diversion. The boat passage would be lined with concrete and flows could be regulated using a weir at the entrance. The diversion structure itself would be designed with a gradual slope for safe passage over the diversion during passable flows. Boater warning signs would be placed at locations above the diversion on both banks.

The Concept Design Report (Appendix B) offers recommendations for construction means and methods. A cofferdam could be installed upstream of the new structure to allow work to be performed in the dry, and demolition of the existing diversion could possibly take place in two phases for dewatering purposes. This alternative includes the use of cobbles and gravel that have been deposited into the river channel below the diversion and at the confluence of Tusher Wash. This alternative would also require the temporary use of approximately 5.5 acres of BLM-managed public lands, 14.5 acres of state sovereign

lands (Green River itself), and 2.3 acres of private lands for staging and access during construction (Figure 3-5).

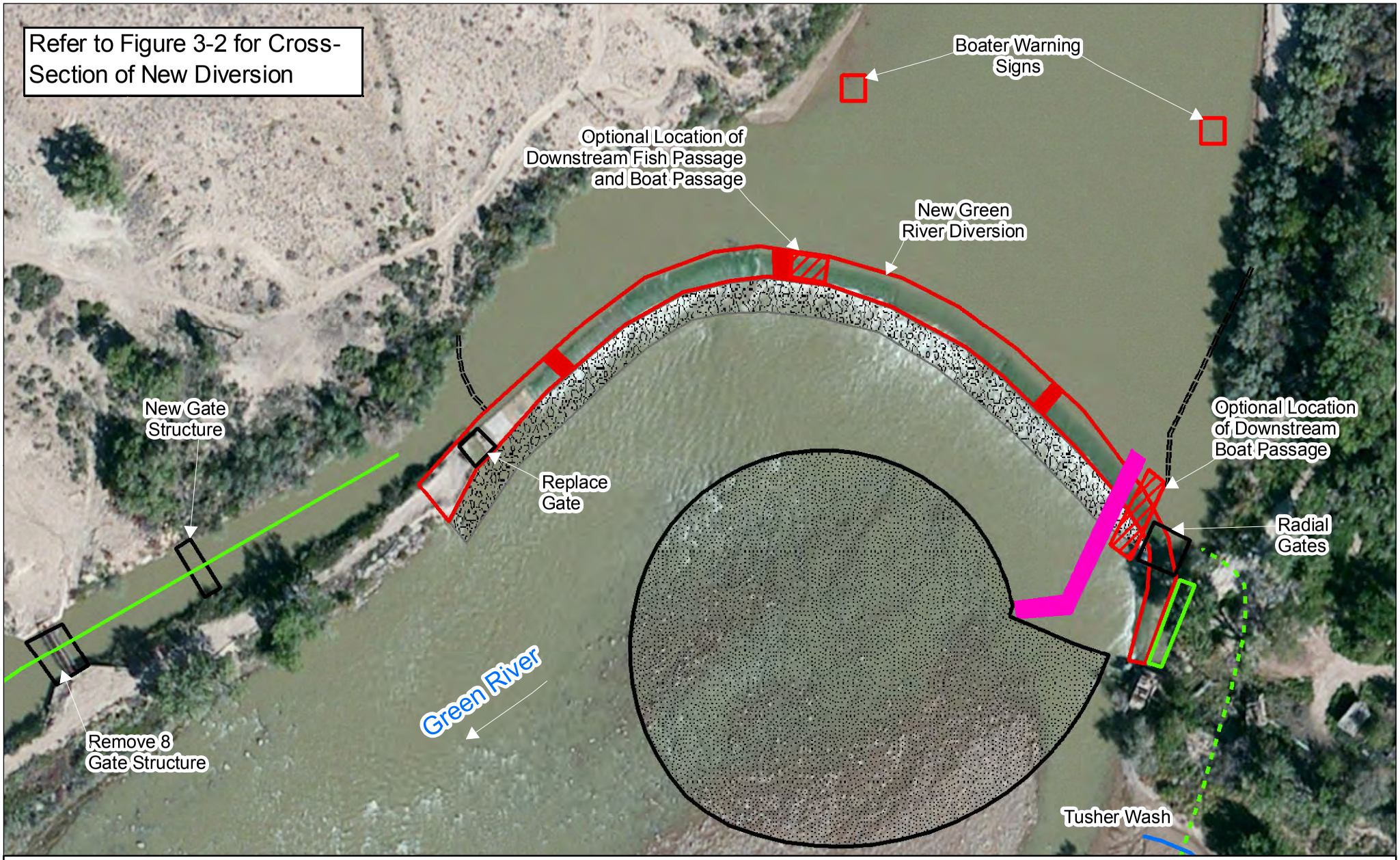

Figure 3-3: Replace In Place with Passages Alt.

NRCS Green River Diversion Rehabilitation
Draft EIS

0 50 100 200 Feet

Legend

- Log Boom
- Canal
- Stream
- Boat Passage
- Fish Passage Notches
- Water Wheel Raceway
- Riprap
- Propsed Sediment Removal (2.5 acres)
- New Gate
- Upstream Fish Passage

N W E S

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Water Rights diversion data from Utah Division of Water Rights(2013). Stream layer from AGRC, based on National Hydrography Dataset. Plan features are approximated and not to scale or defined as final plan.

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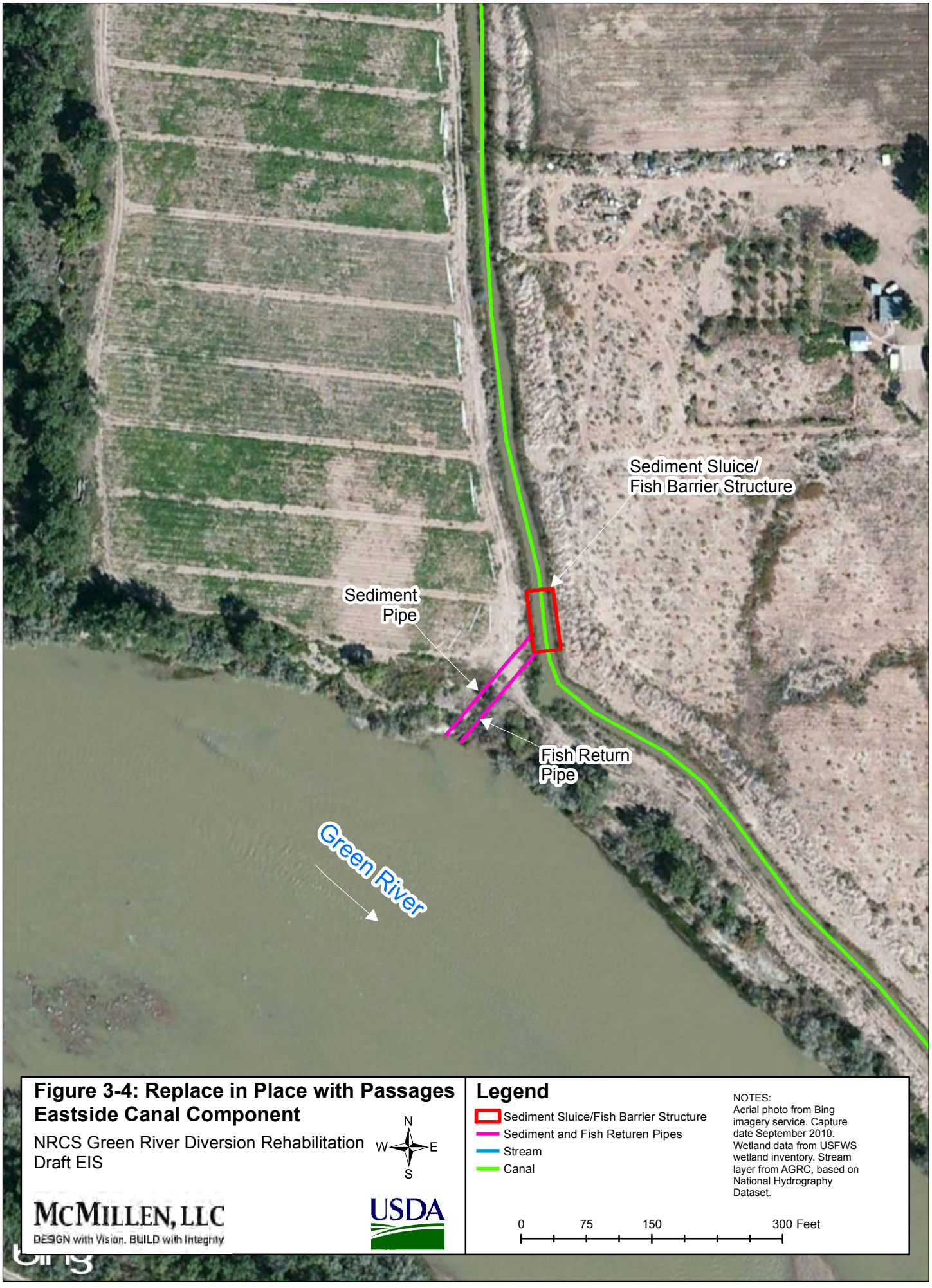

Figure 3-4: Replace in Place with Passages Eastside Canal Component

NRCS Green River Diversion Rehabilitation
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Legend

- Sediment Sluice/Fish Barrier Structure
- Sediment and Fish Returen Pipes
- Stream
- Canal

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Wetland data from USFWS wetland inventory. Stream layer from AGRC, based on National Hydrography Dataset.

0 75 150 300 Feet

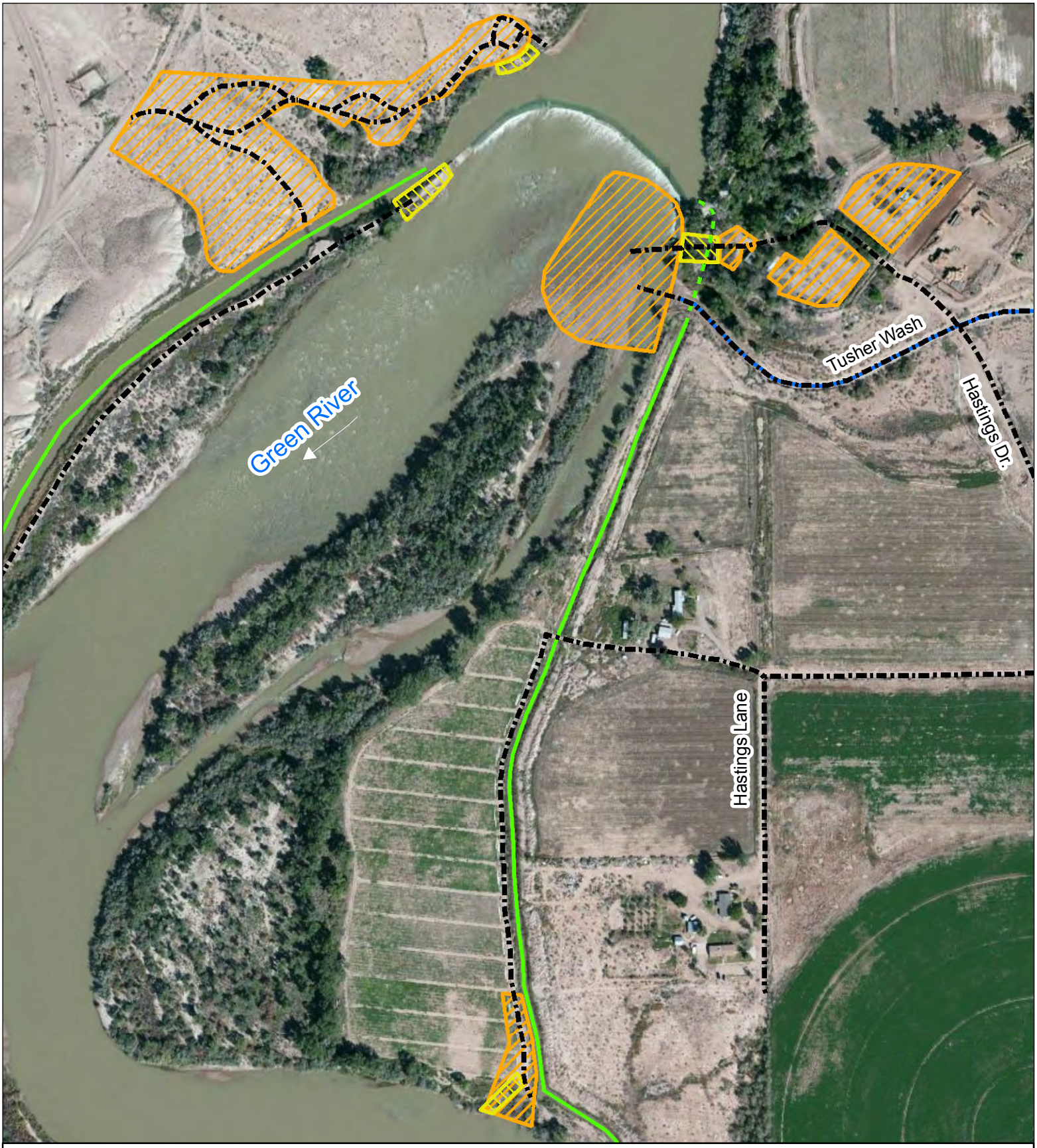

Figure 3-5: Staging and Access (Proposed Action Alts.)

NRCS Green River Diversion Rehabilitation Draft EIS

0 150 300 600 Feet

N W E S

Legend

- Site Access
- Canal
- Stream
- Clear and Grub
- Staging

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Water Rights diversion data from Utah Division of Water Rights(2013). Stream layer from AGRC, based on National Hydrography Dataset. Plan features are approximated and not to scale or defined as final plan.

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3.5. Past, Present, and Reasonably Foreseeable Projects

The Gunnison Butte Irrigation and Eastside High Ditch Project is located south of the project area, between the diversion and the city of Green River. The project plans include the diversion of water directly out of the Green River to irrigate about 5,000 acres of new lands that they currently own or have leased, and about 1,500 acres of supplemental irrigation. This will supply established markets with melons, corn, alfalfa, sod and various row crops (State of Utah, 2000).

The Upper Colorado River Endangered Fish Recovery Program, through funding from the BOR and technical oversight from the USFWS, is working on a fish exclusion system focused on reducing entrainment and to prevent ESA listed fish and other fish species from entering the Green River Canal. The program and project team are working with the Green River Canal Company and Thayn Hydropower to look at a solution downstream of the Thayn Power Plant in the Green River Canal. The project requires a 50 cfs fish return flow and additional head created from the diversion.

The City of Green River, through the National Park Service, Rivers, Trails, and Conservation Assistance (RTCA) Program, which provides planning assistance to cities and counties throughout Utah, is overseeing a new study to establish a trail system that will connect residents and tourists to natural, historic, and modern landmarks, highlight recreational areas, promote health awareness, and seek to establish the first water trail in Utah. The future trail system will expand and promote access to the Green River and connect rural assets surrounding the town. This will be done by establishing trails running along the riverbank and throughout town, promoting access to the river and trail through new signage, and develop the first water trail in Utah. Ongoing project updates, renderings, and maps are available by visiting the Epicenter website (http://ruralandproud.org/tag/green-river-trail-system/).

Trout Unlimited has goals for the Green River, including obtaining a national listing as a Wild and Scenic River.

The Blue Castle site is located about five miles west-northwest of Green River, Utah in Emery County. Currently this new nuclear power plant is in the licensing phase, which will require significant data collection and analysis spanning five years with costs in the tens of millions.

3.5.1. Cumulative Impact Area

Based on the Reasonably Foreseeable Actions known on the Green River in the area, cumulative impacts are expected to the environment as a result of the proposed project. The cumulative impact area assessed in this report is the reach of the Green River upstream to Swaseys Beach/Boat Ramp and downstream to Green River State Park in Green River (see Figure 2-4).

3.6. Preferred Alternative (*To Be Determined*)

In identifying the preferred alternative, NRCS is carefully considering the requirements and intent of the EWP program as well as the expected beneficial and adverse environmental consequences of each

alternative. The Environmentally Preferable Alternative will be chosen upon completion of the extensive resource analysis (presented in Chapter 4, Environmental Consequences and in the Concept Design Report [Appendix B]) as well as the DEIS Public Comment Period. The Preferred Alternative may be the same as the Environmentally Preferable Alternative, and both will be presented in the Final EIS.

3.6.1. Mitigation

Mitigation includes all measures undertaken to avoid, minimize, or compensate for potential adverse environmental impacts. BMPs (listed throughout Chapter 4, per resource) would be implemented during construction in an effort to avoid and minimize impact wherever possible.

SOILS

Erosion may occur on disturbed and cleared areas within the project boundary during precipitation events. Proper BMPs would be installed to prevent and control soil erosion.

Mitigation efforts to reduce sediment in the main channel and west raceway will be implemented with the installation of radial gates. The Operation and Maintenance Plan (Chapter 3.6.2) would specify under which conditions the new radial gates at the diversion and the raceway would be activated.

STREAMS AND WETLANDS

All action alternatives would involve structure repairs that would impact the river channel (bed and bank) as well as small wetland sites within the riparian fringe. Coordination with USACE would be performed to determine if compensatory mitigation would be required for impacts to jurisdictional waters of the US.

PLANTS

All disturbed areas not associated with direct structure repair would be revegetated with approved UDWR plant species. Special precautions would be taken to avoid spreading common reed grass on- or off-site during construction. Methodology for integration of an overall strategy will be formalized into a Post Construction Rehabilitation Plan.

THREATENED AND ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT

All action alternatives would involve temporary impacts to the fish species in the river channel. The Replace In Place With Passages Alternative would provide for upstream and downstream fish passage, as well as PIT tagging to monitor and study fish movement and usage for this reach of the Green River. Fish entrainment in the East Side Canal would also be reduced through the installation of a screen. Further, more specific conservation measures will be explained in detail under the Endangered Species Act Section 7 Consultation once the Preferred Alternative for the project has been selected.

Mitigation efforts to reduce fish entrainment in the west raceway and radial gates include the preparation of an Operation and Maintenance Plan (Chapter 3.6.2) that would specify under which conditions the new

radial gates at the diversion would be activated. These flow conditions would be coordinated with the Recovery Program and UDWR to identify when fish would be expected to be present.

CULTURAL/HISTORICAL RESOURCES

All action alternatives would involve an adverse effect to the existing diversion structure, which is considered to be NRHP-eligible. All action alternatives would involve an adverse effect to the East Side Canal, which is considered to be NRHP-eligible. Mitigation of these adverse effects would occur through the development of a treatment plan that will become formalized in a Memorandum of Agreement (MOA). If unknown cultural/historical resources were encountered during excavation activities, construction would stop and the appropriate agencies would be notified.

3.6.2. Operation and Maintenance

Operation of the structures includes the administration, management, and performance of non-maintenance actions needed to keep the structures safe and functioning as designed. Maintenance includes performance of work, measuring the recording instrumentation data, preventing deterioration of structures, and repairing damage or replacement of the structure as-needed to prevent failure. Damages to completed structures caused by normal deterioration, droughts, flooding, or vandalism are considered maintenance. Maintenance includes both routine and as-needed measures which include:

- Annual control of woody species on or near the diversion, gate, and passage structures.
- Operating structure gates on a monthly basis to ensure proper performance of the gate.
- Regulating or reducing sluicing flows when necessary.
- Other specific items that will be identified during final design.

Inspection of the structures is necessary to verify that the structures are safe and functioning properly. Inspection reports will be supplied to the NRCS following each inspection. Inspections and the associated reports will assess the following items:

- The adequacy of O&M activities,
- Identify needed O&M work,
- Specify ways of relieving unsafe work or performing other needed work, and
- Set action dates for performing corrective actions.

UDAF, local stakeholders, the Recovery Program (if the Replace In Place With Passages Alternative is selected), and the State of Utah (if the Replace In Place With Passages Alternative is selected) will be responsible for the operation, maintenance, and future modifications to the structures on private property. A specific O&M Plan will be prepared by the NRCS, UDAF, local stakeholders, the Recovery Program (if the Replace In Place With Passages Alternative is selected), and the State of Utah (if the Replace In Place With Passages Alternative is selected) that will govern the use of the structures. The specific details of the O&M Plan and agreement will determined during final design and be entered into by all applicable parties prior to the start of construction activities.

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

The purpose of this chapter is to provide a description of how the resources identified would be directly or indirectly and individually or cumulatively affected by the proposed action. The following describes the type of effects and impacts analysis used in this chapter (NRCS 2011). This analysis forms the scientific and environmental basis for the comparisons of alternatives presented in the previous chapter. Environmental impact of the proposed action and alternatives include, but are not limited to, the following:

- *Direct Effect*. Impacts (or effects) caused by a proposed action and that occur at the same time and place.
- *Indirect Effect*. Impacts (or effects) caused by a proposed action and that appear later in time or farther removed in distance, but still reasonably foreseeable.
- *Cumulative Effect*. This refers to the impact on the environment that results from the incremental effect of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.
    - Past and present actions may involve construction and agricultural activities at and near the site, soil contamination, downstream sediments, fish and wildlife habitats, and recreation activities. Foreseeable future actions include the possibility of development due to a new nuclear plant in the area and growth in the recreation and tourism industries in Green River (refer to Section 3.5).
    - The assessment of cumulative impacts is not substantially different from the assessment of direct or indirect impacts. The same types of considerations are made to determine the environmental consequences of the alternatives for direct, indirect, or cumulative impacts. Cumulative impact assessment, however, generally entails a broader perspective (or broader scale) such as what else is happening in the area and/or downstream.
- Construction Impacts and BMPs are included where applicable. Some resources would not be temporarily impacted by project construction activities; in those instances, BMPs are not necessary.
- Conflicts with existing land use plans, policies, or controls
    - Unavoidable
    - Short-term and long-term
- Any adverse environmental effects that cannot be avoided if the proposal is implemented
- The relationship between local short-term uses of the human environment and the enhancement of long-term productivity
- Any irreversible or irretrievable commitments of resources that would be involved in the proposed action if implemented

Impacts proposed by the action alternatives would be similar for most resources and are discussed simultaneously. Where there are differences, the alternatives are discussed separately. Table 4-1 provides a summary comparison of the impacts associated with each alternative. The alternatives proposed for consideration and analyzed in detail in this DEIS have been compared to discern the merits and disadvantages of each alternative. This information is presented in summary, and further detail is provided in subsequent sections. The chapter concludes with detail on construction activities (where applicable), and a summary of cumulative impacts per resource. Where impacts would be unavoidable, mitigation commitments will be made (a preliminary, general list of potential mitigation commitments has been presented in Section 3.5.1).

4.1. Summary and Comparison of Alternatives

Table 4-1. Summary and Comparison of Direct, Indirect, and Short-Term Resource Impacts

Effects	No Action	Replace In Place (Baseline)	Replace In Place With Passages
Soils	*Direct Impacts*: None *Indirect* effect - scouring of soil downstream from diversion failure. Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: Approx 1100 cubic yards of cobble and gravel removed from the Tusher Wash deposition area and used to construct and/or support the diversion *Short-Term*: Potential soil disturbance and sediment into Green River during construction. Temporary disturbance to access roads and staging areas during construction.	*Direct Impacts*: Approx 1100 cubic yards of cobble and gravel removed from the Tusher Wash deposition area and used to construct and/or support the diversion *Short-Term*: Potential soil disturbance and sediment into Green River during construction. Temporary disturbance to access roads and staging areas during construction.
Prime and Unique Farmlands	*Direct Impacts*: None *Indirect and/or Short-Term*: Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: None *Short-Term*: Temporary easement for access during const.	*Direct Impacts*: None *Short-Term*: Temporary easement for access during const.
Water Resources – Water Quality, Hydrology, Floodplains	*Direct Impacts*: None *Short-Term*: Construction activities would temporarily affect sediment levels in river channel.	*Direct Impacts*: None. *Short-Term*: Temp disturbance to river channel.	*Direct Impacts*: None *Short-Term*: Temp disturbance to river channel.
Waters of US including Wetlands	*Direct Impacts*: None *Indirect* effects to streams. Stream channel altered and wetlands washed away or filled with sediment from diversion failure.	*Direct Impacts*: 1.4 ac impact to open waters. *Short-Term*: 14.5 ac temporary impact to open waters; 0.34 ac temporary impact to wetlands.	*Direct Impacts*: 1.4 ac impact to open waters. *Short-Term*: 14.5 ac temporary impact to open waters; 0.34 ac temporary impact to wetlands.
Climate Change	*Direct Impacts*: None	*Direct Impacts*: None	*Direct Impacts*: None

Effects	No Action	Replace In Place (Baseline)	Replace In Place With Passages
Air Quality	*Direct Impacts*: None *Indirect and Short-Term*: None	*Direct Impacts*: None *Short-Term*: Construction activities would temporarily affect air quality in the project area.	*Direct Impacts*: None *Short-Term*: Construction activities would temporarily affect air quality in the project area.
Plants – Riparian Zone and Other	*Direct Impacts*: None *Short-Term*: Damage to vegetation downstream of diversion from failure.	*Direct Impacts*: 0.5 ac of impact *Short-Term*: Potential for additional impact in access and staging areas during construction.	*Direct Impacts*: 0.5 ac of impact *Short-Term*: Potential for additional impact in access and staging areas during construction.
Threatened and Endangered Species	*Direct Impacts*: Obstructed fish passage during low flows. *Short-Term*: Damage to species and habitat downstream of diversion from failure.	*Direct Impacts*: 1.4 acres of impact due to new riprap in channel; No downstream fish passage. Obstructed fish passage during low flows. No fish or wildlife kills anticipated. *Short-Term*: 14.5 ac of disturbance to the channel during construction (designated critical habitat).	*Direct Impacts*: 1.4 ac of impact due to new riprap in channel; no fish or wildlife kills anticipated. Enhancement of passages and installation of monitoring tools for improvement of habitat. *Short-Term*: 14.5 ac of disturbance to the channel during construction (designated critical habitat).
Fish	*Direct Impacts*: Obstructed fish passage during low flows. *Short-Term*: Possible destruction or modification of fish habitat in the channel downstream.	*Direct Impacts*: 1.4 acres of impact due to new riprap in channel; Obstructed fish passage during low flows. *Short-Term*: 14.5 ac of disturbance to the channel during construction	*Direct Impacts*: 1.4 acres of impact due to new riprap in channel; *Short-Term*: 14.5 ac of disturbance to the channel during construction
Wildlife	*Direct Impacts*: None *Short-Term*: Injury or fatality, as well as extreme habitat modifications, in the inundation area from diversion failure.	*Direct Impacts*: 0.5 acres of wildlife habitat impacted (riparian) *Short-Term*: Temp disturbance to project area	*Direct Impacts*: 0.5 acres of wildlife habitat impacted (riparian) *Short-Term*: Temp disturbance to project area
Socioeconomics	*Direct Impacts*: None *Indirect and/or Short-Term*: Adverse effects damage to roads, access and property damages; loss of crops and jobs during floods. Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: None *Short-Term*: Job creation during construction.	*Direct Impacts*: None. *Indirect*: Possible increase in tourism, economy in the vicinity due to provision of boat passage. *Short-Term*: Job creation during construction.

Effects	No Action	Replace In Place (Baseline)	Replace In Place With Passages
Cultural/Historic	*Direct Impacts*: None *Indirect and/or Short-Term*: historic diversion structure would be adversely affected.	*Direct Impacts*: Structure demolition and E Side Canal improvements a significant adverse effect. *Short-Term*: Construction activities, staging of equipment and materials, and river access temp impacts to eligible sites. Mitigate adverse effects through the development of a treatment plan that will become formalized in a Memorandum of Agreement (MOA).	*Direct Impacts*: Structure demolition and E Side Canal improvements a significant adverse effect. *Short-Term*: Construction activities, staging of equipment and materials, and river access temp impacts to eligible sites. Mitigate adverse effects through the development of a treatment plan that will become formalized in a Memorandum of Agreement (MOA).
Recreation/Public Health & Safety	*Direct Impacts*: None *Indirect and/or Short-Term*: High hazard and loss-of-life potential in the event of diversion failure.	*Direct Impacts*: None *Indirect and/or Short-Term*: Reduction of loss-of-life potential.	*Direct Impacts*: Enhanced recreation opportunities for the boating community due to provision for boat passage. *Indirect and/or Short-Term*: Reduction of loss-of-life potential.
Visual Quality/ Aesthetics/Scenic Beauty	*Direct Impacts*: None *Indirect and/or Short-Term*: Construction site would degrade the area temporarily.	*Direct Impacts*: None *Indirect and/or Short-Term*: Construction site would degrade the area temporarily.	*Direct Impacts*: None *Indirect and/or Short-Term*: Construction site would degrade the area temporarily.
Land Use/Rights	*Direct Impacts*: None *Short Term*: Temporary Downstream Effects to 4,000 ac of cropland.	*Direct Impacts*: None *Short-Term*: Temporary easement (approx.5.5 ac.) for BLM access during const. Special Use Lease (State of Utah) – 14.5 ac (temp. construction); 1.4 ac permanent easement.	*Direct Impacts*: None *Short-Term*: Temporary easement (approx.5.5 ac.) for BLM access during const. Special Use Lease (State of Utah) – 14.5 ac (temp. construction); 1.4 ac permanent easement.
Infrastructure - Transportation	*Direct Impacts*: None *Indirect and/or Short-Term*: Adverse effects from damage to roads from a diversion failure. Loss of access during floods.	*Direct Impacts*: None *Indirect and/or Short-Term*: Temporary affects to road during construction	*Direct Impacts*: None *Indirect and/or Short-Term*: Temporary affects to road during construction

4.2. Soil Resources

4.2.1. Geology, Stream Bank Erosion, and Sedimentation

4.2.1.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not change existing conditions with regard to geology, erosion and sedimentation at the diversion. The diversion would be left in its current condition, and sediment would continue to accumulate within the upstream pool area.

In the event of a diversion failure, this alternative would have an indirect impact on erosion and sedimentation within the Green River drainage downstream; soils that have settled into the river bottom would potentially be washed downstream from the high volumes of water exiting the diversion structure. Sedimentation in the Green River would increase as these soils would settle out of the water column in slower velocity areas covering existing stream, riparian, and wildlife habitat.

In the event of diversion failure, scouring in the channel below the diversion would occur. The extent of channel scour would be dependent upon how badly the diversion failed. A complete failure of the diversion could result in appreciable erosion of the Green River channel as well as clearing of the majority of vegetation in the flow path immediately downstream. Streambank erosion would potentially increase with minimal riparian vegetation.

4.2.1.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

The sediment deposits upstream of the diversion would be directly impacted by any of the action alternatives. This alternative does not provide for additional sediment sluicing, however one existing sluice/water control gate would transport sediment from the bottom of the river downstream, helping to keep the raceway and irrigation canals clean. Direct impacts to soil would also be associated with erosion along streambanks in disturbed areas. Best Management Practices (BMPs) will be implemented during construction to minimize impacts to banks and these practices are listed below. The proposed action would not have an indirect impact on soil or geologic resources.

4.2.1.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

The sediment deposits upstream of the diversion would be directly impacted by any of the action alternatives. The installation of sediment sluice gates would transport sediment in the bottom of the river downstream helping to keep the raceway and irrigation canals clean. Direct impacts to soil would also be associated with erosion along streambanks in disturbed areas. Best Management Practices (BMPs) will be implemented during construction to minimize impacts to banks and these practices are listed below. The proposed action would not have an indirect impact on soil or geologic resources.

CONSTRUCTION IMPACTS AND BMPS

BMPs aim to minimize the transport and deposition of sediment in the area during construction. Soils dredged from the large deposition area where Tusher Wash meets the Green River would be utilized to provide structural fill wherever possible. The soils would be separated and filtered for appropriate size and composition of material, with the top layer of sediment discarded due to the high density of fine material. This could amount to approximately 1100 cubic yards of cobble and gravel removed from the deposition area and possibly used to construct and/or support the diversion.

Impacts to soils in staging areas and along access roads would be temporary during construction. Approximately 2.3 acres on the east and 5.5 acres on the west banks will be temporarily disturbed.

Short-term construction impacts would include bank erosion until vegetation was established. BMPs including but not limited to, the following would be implemented during construction to minimize these impacts.

- Rock riprap would be placed upstream of the diversion.
- Water bodies adjacent to construction and staging areas will be identified, and such measures as straw bales, silt fences, and other appropriate sediment control BMPs would be implemented to prevent the entry of sediment and other contaminants into waters.

Following construction, all sediment control BMPs will be removed along with any accumulated sediment and disposed of in an off-site location at the appropriate time.

4.2.2. Prime and Unique Farmlands

There are farmlands of statewide importance in the project vicinity. The Redbank-Flatnose Families Association soils are found immediately adjacent to the existing structure and downstream along the East Side Canal.

4.2.2.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no direct impact on the farmland soils of statewide importance in the area. In the event of a diversion failure, this alternative would have an indirect impact on farmlands due to excess sediment washing downstream, potentially settling into areas along the banks of the East Side Canal.

4.2.2.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Direct impacts to prime and unique farmlands would primarily be associated with erosion along stream banks immediately downstream of the diversion. The proposed action would not involve the acquisition of private property that is used for agricultural production and would not be expected to induce further stream bank erosion that could alter prime and unique farmland. The proposed action will not indirectly impact prime and unique farmlands in the project area.

CONSTRUCTION IMPACTS AND BMPS

All alternatives involve stream bank stabilization components such as riprap. This type of BMP will be implemented during construction to avoid or minimize impact to the banks upstream of the diversion.

Temporary staging of equipment and access along existing roads and on area properties would require impacts to those soils deemed prime and unique for farming. However, these areas proposed for staging and access are not currently irrigated; therefore any temporary impact during construction would not alter any existing farmland designation.

4.3. Water Resources

Activities related to water resources are regulated by EPA, the U.S. Army Corps of Engineers (USACE), and the Utah Department of Environmental Quality (UDEQ). Appropriate permits will need to be obtained for any activities regulated by the Clean Water Act (CWA), and include the following:

- Section 404 Permit: for discharge of fill into waters of the US (jurisdictional wetlands)
- Section 401 Water Quality Certification: certification for activity that is subject to authorization under Section 404 of the CWA
- Section 402 of the CWA for construction activities: National Pollutant Discharge Elimination System (NPDES) permit (for construction over 1 acre), as administered by the Utah Pollutant Discharge Elimination System (UPDES)
- Stream alteration permits: required for any work in or near streams in the State of Utah

Coordination with participating agencies is ongoing. Specific area management plans may exist that the project will need to comply with to meet the requirements set forth as part of those plans.

4.3.1. Water Quality

An effective Storm Water Pollution Prevention Plan with appropriate BMPs would be implemented to avoid and minimize water quality impacts and sedimentation during construction (to be produced prior to construction).

4.3.1.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no direct impact on the water quality of the Green River. Existing conditions would remain as they are currently.

In the event of a diversion failure, this alternative would have an indirect impact on water quality due to excess sediment washing downstream, potentially settling into areas along the banks of the East Side Canal. In this event, a large volume of water and stored sediment would flow downstream over a short period of time. The water quality in the river would be degraded from fill material, upland soils, and destruction of vegetation, violating federal and state water quality rules and regulations.

Indirect effects would include bed and bank erosion to the river channel and to the East Side and Green River canals from gradual erosion until the banks became stabilized over time.

4.3.1.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Rehabilitating, including repairing or replacing, the diversion would not alter surface water quality or increase sedimentation at the site.

The water quality in the project area is not currently listed as "impaired" and meets most beneficial uses. The proposed action would not alter the water quality of this segment of the Green River. The proposed action would have no indirect impact on the water quality of the Green River.

CONSTRUCTION IMPACTS AND BMPS

During construction activities, water quality of the Green River could be impacted due to an accumulation of sediment; however, implementation of construction BMPs would minimize this potential. Further, increases in runoff would not be expected to result in changes to the total maximum daily load (TMDL) for sediment. Construction projects are required to have storm water permits and also to address storm water and sediment management as part of local and state ordinances and regulations.

Erosion control and sediment removal are very important temporary and permanent design considerations because soils within the project area are highly susceptible to erosion in certain locations. Aggressive temporary erosion control and sediment removal measures would need to be implemented during construction until permanent slope stabilization and water quality improvement facilities were constructed.

Project design elements, including BMPs, would be used and would be implemented to reduce the quantity of sediment (1) entering the Green River Canal, Thayn Powerhouse raceway, East Side Canal, and the Hastings Ranch; and (2) flowing downstream and violating any federal or state water quality rules and regulations. The diversion rehabilitation would also meet UPDES and Utah antidegradation requirements. Construction BMPs would include, but are not limited to, the following:

- A Storm Water Pollution Prevention Plan (SWPPP) that contains erosion and sediment control and pollution prevention BMPs, such as, but not limited to, silt fences, fiber wattles, and/or earth berms, will be required and implemented.
- Construction activities impacting irrigation will be coordinated with the managing entity to ensure no interruption of service and to minimize adverse impacts.
- Water bodies adjacent to construction and staging areas will be identified, and such measures as straw bales, silt fences, and other appropriate sediment control BMPs will be implemented to prevent the entry of sediment and other contaminants into waters.
- To ensure that accidental spills do not enter waters, the storage of petroleum-based fuels and other hazardous materials and the refueling of construction machinery will not occur outside of approved designated staging/batch plant areas. Furthermore, the project will comply with state and federal water quality standards and toxic effluent standards to minimize any potential adverse impacts from discharges to waters of the US.
- No construction materials shall be stockpiled or deposited in or near any water bodies.

A Hazardous Materials Spill Prevention/Contingency Plan shall be developed and approved prior to construction.

4.3.2. Hydrology

Both action alternatives raise the water surface elevation 1 foot, which ensures water delivery to water users. Project stakeholders have expressed concern that the project design will exacerbate upstream flooding. For this reason, the 100-year discharge (48,170 cfs) was used in hydraulic simulations of the alternatives in order to ensure that the final concept design does not increase upstream flooding. This will be a requirement of the Preferred Alternative as well.

4.3.2.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no direct impact on hydrology. In the event of a diversion failure, this alternative would have an indirect impact on hydrology. Excess flows would travel downstream and potentially flood properties downstream.

4.3.2.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

Rehabilitating or replacing the diversion without the proposed design components that provide for fish and boat passage would have a net impact on the hydrology of the Green River. It is possible that at certain times of the year the gates at the west raceway and the west end of the diversion would be closed, creating temporary upstream flooding.

4.3.2.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

Rehabilitating or replacing the diversion with the proposed design components would have no net impact on the hydrology of the Green River. The Concept Design Report (Appendix B) includes a hydrologic analysis of the action alternatives which concludes that the action alternatives would result in no change to the flow of the Green River.

CONSTRUCTION IMPACTS AND BMPS

Flows in the river would be temporarily altered to accommodate construction activities in the channel. Construction means and methods would be determined during the final design of the project; however, the Concept Design Report (Appendix B, Sheets GC003 and GC005) does include general recommended Construction Phasing and Dewatering Plans, which show the potential use of berms, dewatering bladders and pumps.

4.3.3. Water Rights

The Concept Design Report (Appendix B) indicates that the large variations in flows observed at the Green River Diversion make it important that the project alternatives satisfy a range of water demands over as broad a range of flows as possible. The hydrologic analysis in the report concludes that the demands at the diversion will be met.

4.3.3.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have direct impacts to the water rights associated with the diversion, as the existing structure currently does not guarantee delivery. This alternative would indirectly impact all water rights from the total loss of water delivery if the diversion failed. In the event of a diversion failure, this alternative would have an indirect impact on water rights. Excess sediment would travel downstream and potentially hinder the function of irrigation canals, threatening the loss of irrigation water for 4,000 acres of cropland.

4.3.3.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

This alternative would provide the same level of service to the existing water right holders, and therefore would have no direct or indirect impact on water rights.

CONSTRUCTION IMPACTS AND BMPS

Water rights may be temporarily impacted during project construction, however the project commitment to the water users includes the following (from the Concept Design):

- Deliver 773 cfs from April to October to Green River Canal and raceway.
- Deliver 650 cfs from November to March to Green River Canal and raceway.
- Schedule temporary flow shutdowns in winter to avoid impacts to hydropower production.
- Deliver 65 cfs April to October to Hastings Ranch pump station.
- Deliver 31 cfs April to October to the East Side Canal siphon.

4.3.3.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

This alternative would provide the same level of service to the existing water right holders and adds fish and boat passage as well. The overall demand to be met at the Green River Diversion for this alternative includes water allocation for water rights holders, fish bypass in the hydropower raceway or Green River Canal, sediment sluicing, boat passage, upstream fish passage, and downstream fish passage. The estimated demand from perfected water rights at the Green River Diversion is 819 cfs, and therefore the total water demand at the diversion structure for this alternative is 1,066 cfs. Table 4-2 lists the water demands at the diversion with the implementation of this alternative. Due to the available flows (see Section 2.2.2) this alternative would have no direct or indirect impact on water rights.

Table 4-2. Water Demands - Replace In Place With Passages Alternative

Use	Demand (cfs)
Water Rights Holders	819
Fish Bypass	30
Boat Passage	147
Upstream Fish Passage	30
Downstream Fish Passage	40
TOTAL	**1,066**

The Hydrology Memo in the Concept Design Report (Appendix B) concludes that flow rates during the growing season from April 1 through October 31 at the diversion structure required to meet the demands associated with this project (1,066 cfs) have been met every day since 2006.

CONSTRUCTION IMPACTS AND BMPS

Water rights may be temporarily impacted during project construction, however the project commitment to the water users includes the following (from the Concept Design):

- Deliver 773 cfs from April to October to Green River Canal and raceway.
- Deliver 650 cfs from November to March to Green River Canal and raceway.
- Schedule temporary flow shutdowns in winter to avoid impacts to hydropower production.
- Deliver 65 cfs April to October to Hastings Ranch pump station.
- Deliver 31 cfs April to October to the East Side Canal siphon.

4.3.4. Groundwater

4.3.4.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no impact on the existing groundwater supply and levels at the project site. This alternative would have an indirect impact on groundwater levels and/or quality downstream in the event of diversion failure, due to the potential for inundation of low-lying areas in the floodplain.

4.3.4.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

The action alternatives would have no direct impacts on groundwater. The action alternatives would have no indirect impacts on groundwater. The Concept Design Report (Appendix B) analyzed the potential project impacts on groundwater, with negligible results for all alternatives.

CONSTRUCTION IMPACTS AND BMPS

General construction impacts that could occur include potential impacts from contaminated soil or groundwater. There is also the potential impact to the environment from the release of a hazardous material brought on-site during construction activities. NRCS requires that contractors comply with all federal, state, and local laws and regulations pertaining to pollution and contamination of the environment to prevent pollution of surface water, groundwater, soil, and air with any hazardous materials.

4.3.5. Floodplains

A Floodplain Development Permit would be required by Emery and Grand counties.

4.3.5.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not result in direct changes to the function of the 100-year floodplain nor would it incur further impact on the floodplain. The No Action Alternative would potentially result in changes to the function of the existing floodplain in the event of diversion failure. Over the short-term, this alternative would likely result in an increased flood hazard. Properties within Green River floodplain downstream of the diversion structure would potentially experience high volumes of water exiting the diversion structure and dispersing into the floodplain.

4.3.5.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Hydraulic analysis for impacts to floodplains and the results are presented in the Conceptual Design Report (Appendix B). Upstream of the diversion location the model output shows slight differences in the flood elevation with the implementation of this alternative. Analysis resulted in the difference in water depth between existing conditions and both action alternatives to be less than 1 foot.

CONSTRUCTION IMPACTS AND BMPS

Construction activities could cause an increase in erosion/sedimentation due to clearing and grading. Potential temporary effects include construction impacts to water quality, wetlands and floodplain encroachments along the river and at the canals and laterals in the study area. These potential impacts would be minimized through the implementation of a SWPPP and incorporation of BMPs into the final project design.

4.3.6. Waters of the US and Wetlands

Waters of the US, including wetlands, are currently being assessed in accordance with the 1987 USACE Wetlands Delineation Manual and the 2008 Arid West Regional Supplement. A Preliminary Wetland Inventory Memo is provided in Appendix C. The *Waters of the US and Wetlands Delineation Report* (to be produced in Spring 2014) describes the jurisdictional and non-jurisdictional waters of the US and wetlands in the project area. The report will provide additional detail on each open water and wetland in the project area. Table 4-2 summarizes and provides a comparison of the impacts described below for each alternative.

USACE and the Utah Division of Water Resources (UDWRe) will be provided copies of the Joint Application for Permit for comment and approval. USACE Sacramento District Regional General Permit 4 was issued to facilitate efficient Department of the Army permit processing for minimal impact projects that are beneficial to the recovery of the Upper Colorado River endangered fish species. All necessary permits must be obtained prior to commencement of emergency EWP program actions.

4.3.6.1. No Action Alternative

The No Action Alternative would not impact waters of the US or wetlands.

4.3.6.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Based on preliminary project plans, approximately 1.4 acres of open waters (Green River) would be directly impacted by either action alternative. The impacts identified are all associated with jurisdictional waters of the U.S. and wetlands.

Indirect impacts to wetlands would include potential sediment deposition from construction activities. However, because there will be no net loss of wetlands, no indirect net loss of wetlands is expected to occur.

Table 4-3. Summary of Impacts to Waters of the US, including Wetlands

Resource	Alternatives	Description of Consequence	Specific Resource Impacted Location and Acreage
WATERS OF THE U.S., INCLUDING WETLANDS	No Action	None.	No Effect
	Replace In Place	Potential impact to waters of the US	**1.4 ac. of Open Waters** will be impacted by this alternative.
	Replace In Place With Passages	Potential impact to waters of the US	**1.4 ac. of Open Waters** will be impacted by this alternative.

CONSTRUCTION IMPACTS AND BMPS

The action alternatives would temporarily impact the channel of the Green River. Approximately 14.6 acres of the channel are located within the estimated project footprint.

Figure 4-1 shows the potential impacts proposed by the action alternatives. Temporary impacts to open water would include the area that would be potentially "de-watered" during construction (14.5 acres). The Preliminary Wetland Inventory identified emergent wetlands on the east and west banks that would potentially be impacted during construction (0.34 acres). Temporary impacts would also occur to riverine wetlands within the channel (4.25 acres).

Construction activities could cause an increase in erosion/sedimentation due to clearing and grading. Potential temporary effects include construction impacts to water quality, wetlands and floodplain encroachments along the river and at the canals and laterals in the study area. These potential impacts would be minimized through the implementation of a SWPPP and incorporation of BMPs into the final project design.

4.3.7. Climate Change

4.3.7.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

Climate change in Utah is resulting in declining snowpack and an increase in droughts. The No Action Alternative would have no direct impact on climate change. Direct effects from the reduction in precipitation in the watershed would result in a lower risk for high volumes of water to flow through the river. No indirect effects would be anticipated from climate change.

4.3.7.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

All alternatives of the proposed action would allow the diversion to remain in the same general location, keeping the water level of the Green River within 1 foot of what it is currently. Direct effects from the reduction in precipitation in the watershed would result in a lower risk for high volumes of water to flow through the river.

The proposed action would not be expected to have any effect on climate change. However, the reduction in flows in the Green River during the drier summer months may result in water rights holders not being allocated the full water right depending on their priority status. Fish and boat passage may also be unattainable during low flows.

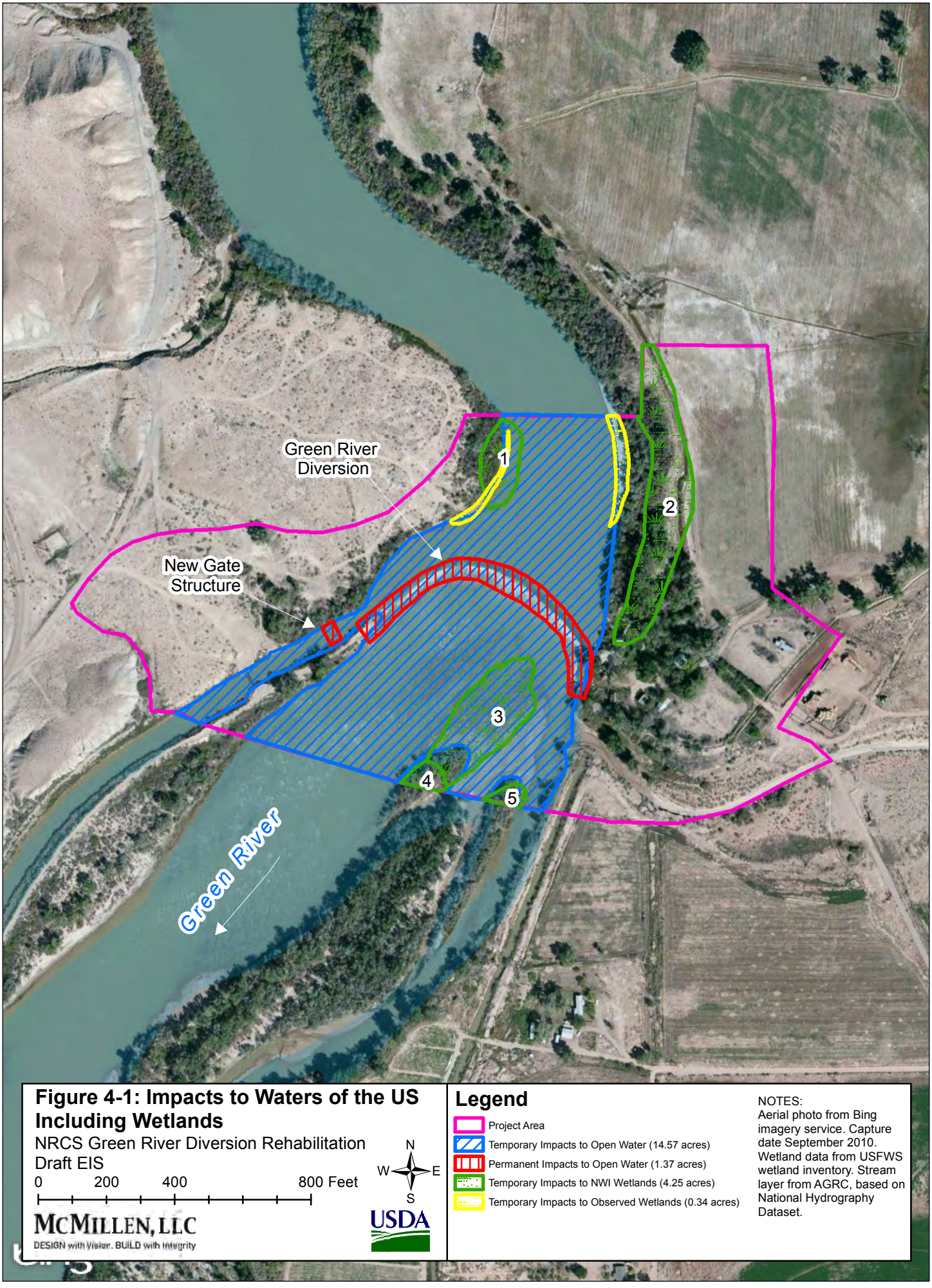

Figure 4-1: Impacts to Waters of the US Including Wetlands

NRCS Green River Diversion Rehabilitation Draft EIS

0 200 400 800 Feet

N W E S

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity

USDA

Legend

- Project Area
- Temporary Impacts to Open Water (14.57 acres)
- Permanent Impacts to Open Water (1.37 acres)
- Temporary Impacts to NWI Wetlands (4.25 acres)
- Temporary Impacts to Observed Wetlands (0.34 acres)

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Wetland data from USFWS wetland inventory. Stream layer from AGRC, based on National Hydrography Dataset.

4.4. Air Quality

4.4.1.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not directly or indirectly impact air quality because no construction would take place.

4.4.1.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Direct and indirect impacts to air quality in the vicinity of the project would not be anticipated.

CONSTRUCTION IMPACTS AND BMPS

Construction activities would temporarily emit several air pollutants. PM_{10} emissions are associated with the dust created from demolition, land clearing, ground excavation, cut-and-fill operations, and road construction. All other pollutants ($PM_{2.5}$, CO, SO_x, NO_x, MSAT, and GHG) are generated from heavy-duty diesel engines used by the construction equipment. Construction emissions are greatest during the earthwork phases because of the dust associated with this activity. Fugitive dust can also be produced by winds blowing through the construction site and by trucks carrying uncovered loads. Additionally, mud tracked out onto paved roads leading to and from the construction site creates a source of fugitive dust (i.e., road dust) after it dries.

Emissions from trucks and construction equipment powered by heavy duty diesel engines would be temporary and concentrated around the construction site. Delays associated with travel through construction zones would increase emissions from on-road vehicles. However, these temporary delays would likely only result in a small amount of additional pollutant emissions when compared with the usual traffic experienced around the construction site.

UDEQ requires the control of fugitive dust from all construction sites. Fugitive dust, Mobile Air Source Toxics (MSAT), and GHG emissions increases associated with construction would be minimized by implementation of applicable BMPs. These include the following:

- Spraying the soil on-site with water, or other similar approved dust suppressant/soil binder.
- Wetting materials hauled in trucks, providing adequate freeboard (space from the top of the material to the top of the truck), or covering loads to reduce emissions during material transportation/handling.

- Providing wheel washers, or similar BMP, at construction site accesses to reduce track-out of site materials onto the adjacent roadway network.
- Removing tracked-out materials deposited onto adjacent roadways.
- Wetting material stockpiles to prevent wind-blown emissions.
- Establishing vegetative cover on bare ground as soon as possible after grading to reduce wind-blown dust.
- Requiring appropriate emission-control devices on all construction equipment.
- Requiring the use of cleaner burning fuels.
- Using only properly operating, well-maintained construction equipment.

4.5. Plants

This section describes the impacts of the proposed action on the plant resources in the project area.

Necessary consultation will be performed as required by Section 7 of the ESA and related NRCS guidelines if ESA listed plants are present in the project area. Section 7(a)(2) of the ESA requires that all federal agencies ensure that their actions to authorize, permit, or fund a project do not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat of listed species.

The study area and the Green River Diversion are located at approximately 4,090 feet elevation. The majority of the listed plant species occur at higher elevations than the study area. Furthermore, the listed plant species have very specific soils which they occur on, none of which occur within the study area. The majority of the listed species are found in soil formations that occur within the San Rafael Swell which is southeast of the study area. Based on these facts, no ESA-listed plant species are expected to occur within the Green River Diversion project area and thus there will be no impacts as a result of the project.

4.5.1. Vegetation and Riparian Communities

4.5.1.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not impact specific vegetation communities nor would it impact the riparian communities in the project area. In the event of diversion failure, indirect impacts to specific plant communities would occur, generally associated with erosion and ground disturbance on the east and west banks of the river.

4.5.1.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

The action alternatives would disturb and/or remove small amounts of trees, shrubs and grasses on the east and west banks of the river. The typical vegetation community within the impacted area consists of wetland grasses, kochia, Russian olive, wild rose, tamarisk, and some willows, cottonwoods along the banks and within the riparian fringe of the river. Vegetation would be permanently cleared to account for the larger gate structures, a new west side gate and structure, and the rehabilitation of the existing gate on the west side. The action alternatives would impact areas within the riparian fringe along the banks of the river. Table 4-4 shows each alternative and the direct (and/or indirect) impacts to the riparian plant community. The slight change proposed to the water surface elevation upstream of the diversion would not have an impact on the vegetation on the east and west banks.

CONSTRUCTION IMPACTS AND BMPS

Approximately 7.8 acres of bare ground, existing road/drive way, and native vegetation disturbed from construction activities would be restored using native plant species. During construction and until the restoration area was fully established, the area would be maintained on a regular basis to prevent the establishment of noxious weeds and invasive plant species. Non-desirable plant species would be controlled by cleaning equipment prior to delivery to the project site, eradicating these species before the start and during construction as discovered, and routine monitoring would take place after construction completion.

Table 4-4. Summary of Impacts to Plant Communities

Resource	Alternatives	Description of Consequences	Specific Resource Impacted Locations and Acreage
PLANTS – RIPARIAN ZONE	No Action	None.	No Effect
	Replace In Place	Loss of riparian vegetation	Clearing and Grubbing, Tree Removal = 0.5 ac.
	Replace In Place With Passages	Loss of riparian vegetation	Clearing and Grubbing, Tree Removal = 0.5 ac.

4.5.2. Endangered and Threatened Species and Species of Concern - Plants

4.5.2.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not impact the threatened or endangered plant species that occur within Emery and Grand counties.

4.5.2.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

The proposed action would not impact the threatened or endangered plant species that occur within Emery and Grand counties.

4.5.3. Invasive Plant Species and Noxious Weeds

The project area is in a location where invasive plant species and noxious weeds are known to occur or where risk of an invasion exists. A disturbed area, such as a construction site with access roads, would be considered an area at risk.

4.5.3.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not change the land use or existing diversion structure; therefore, this alternative would not put the project area at risk by introducing invasive plant species and noxious weeds during construction.

4.5.3.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

All alternatives would put the project area at risk for future invasion of noxious weeds. Construction BMPs (listed in Section 4.8) would be implemented to minimize the short-term impacts associated with ground disturbance. Long-term negative impacts will be managed with re-planting, and various methods of weed control.

CONSTRUCTION IMPACTS AND BMPS

During construction activities, area roads would be utilized by trucks and equipment to access the site; however, implementation of construction BMPs would minimize the potential for transport of invasive plant species and noxious weeds into the area. During construction and until the restoration area is fully established, it would be maintained on a regular basis to prevent the establishment of noxious weeds and invasive plant species. Non-desirable plant species would be controlled by cleaning equipment prior to delivery to the project site, eradicating them before the start and during construction as discovered, and routine monitoring after construction completion.

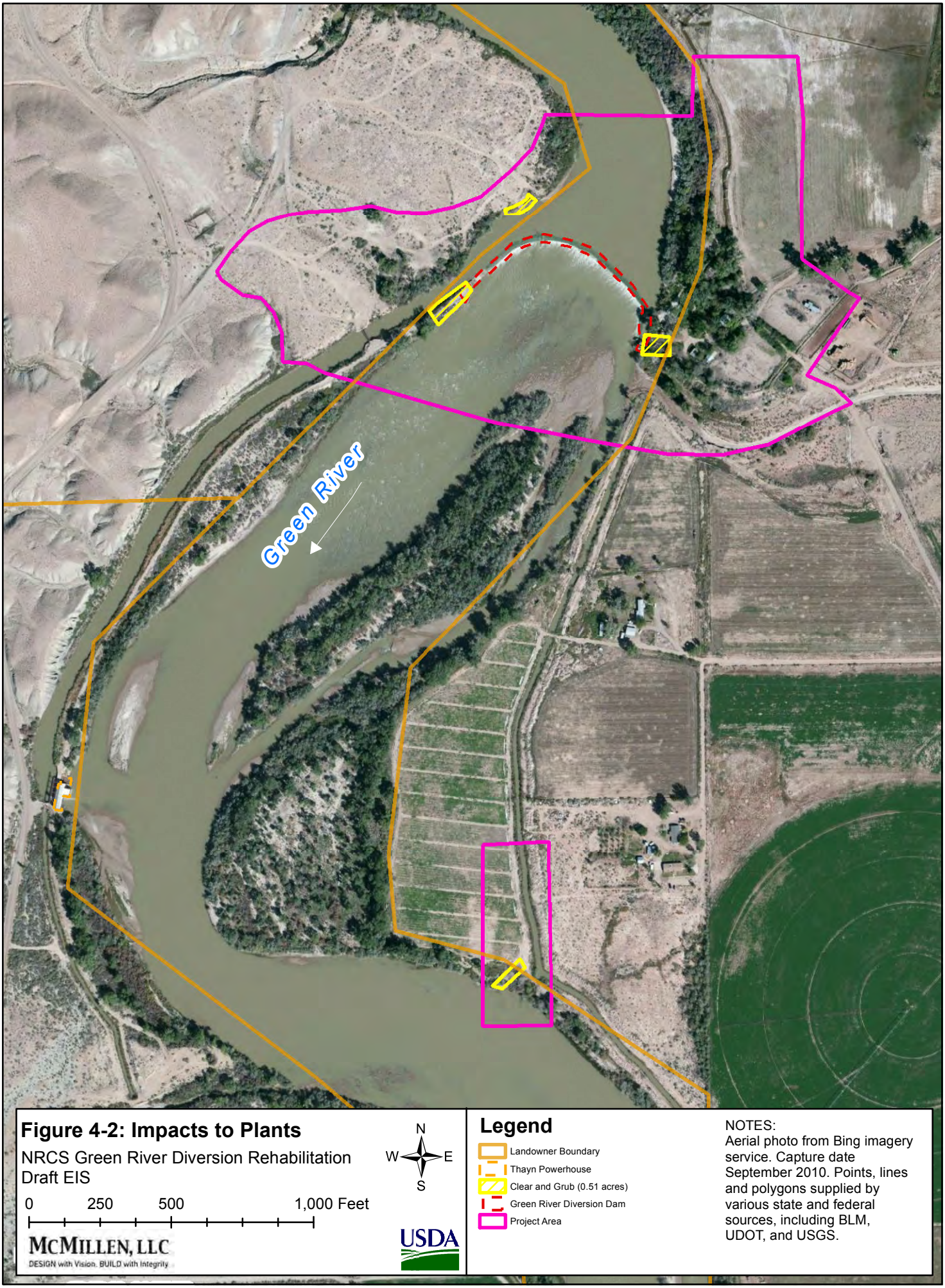

Figure 4-2: Impacts to Plants

NRCS Green River Diversion Rehabilitation
Draft EIS

0 250 500 1,000 Feet

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USDA

Legend

- Landowner Boundary
- Thayn Powerhouse
- Clear and Grub (0.51 acres)
- Green River Diversion Dam
- Project Area

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Points, lines and polygons supplied by various state and federal sources, including BLM, UDOT, and USGS.

4.6. Animals

Necessary consultation will be performed as required by Section 7 of the ESA and related NRCS guidelines. Section 7(a)(1) of the ESA requires that all federal agencies utilize their authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species and threatened species. Section 7(a)(2) of the ESA requires that all federal agencies ensure that their actions to authorize, permit, or fund a project do not jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of critical habitat of listed species.

Biological resources include the presence and habitat of fish and wildlife found in the project area. The Migratory Bird Treaty Act of 1918 made it illegal for people to "take" migratory birds, their eggs, feathers, or nests. “Take” is defined in the Act to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof. In addition, the Bald and Golden Eagle Protection Act affords additional protection against “taking” of bald and golden eagles.

4.6.1. Habitat

4.6.1.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not impact fish or wildlife habitat. In the event of diversion failure, indirect impacts to habitat would occur, generally associated with erosion and ground disturbance on the east and west banks of the river.

4.6.1.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

This alternative would result in continued habitat fragmentation. The existing diversion structure has created fragmentation to some degree, and although this alternative would rehabilitate the diversion it would not provide upstream or downstream fish passage. Therefore, connectivity would not be restored to this section of Green River. This alternative would directly impact fish and wildlife habitat, due to the study area designation of critical habitat for two of the four listed endangered fish species found in this reach of the Green River; this issue is provided further detail in Section 4.6.2. Impacts associated with this alternative are the same as presented in Section 4.6.1.3.

4.6.1.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

The proposed action would directly impact fish and wildlife habitat. However, the proposed action would not result in habitat fragmentation. In fact, the existing diversion structure has created fragmentation to some degree. This alternative provides upstream and downstream fish passage, therefore connectivity

will be restored to this section of Green River. The study area is designated critical habitat for two of the four listed endangered fish species found in this reach of the Green River; this issue is provided further detail in Section 4.6.2. Approximately 1.4 acres of fish habitat (included designated critical habitat for two endangered fish species) would be impacted by the downstream armoring of the new diversion structure with riprap proposed by this alternative (Figure 4-3).

This alternative proposes to impact 0.5 acres on the east and west banks of the river. The typical vegetation community within the impacted area consists of willows, cottonwoods and tamarisk along the banks of the river, which could provide habitat for any number of area wildlife. Potential habitat would be permanently cleared to account for the larger gate structures, a new west side gate and structure, and the rehabilitation of the existing gate on the west side. Table 4-5 shows each alternative and the direct impacts to fish and wildlife habitat.

Table 4-5. Summary of Impacts to Fish and Wildlife Habitat*

Resource	Alternatives	Description of Consequences	Specific Resource Impacted Locations and Acreage
FISH AND WILDLIFE HABITAT	No Action	None.	No Effect
	Replace In Place	Loss of vegetation on banks Riprap in channel	Approx. 0.5 acres; 1.4 ac of impact to designated critical habitat-fish species
	Replace In Place With Passages	Loss of vegetation on banks Riprap in channel	Approx. 0.5 acres; 1.4 ac of impact to designated critical habitat-fish species

*Note: the river channel itself is considered designated critical habitat for 2 endangered fish species (see Sec 4.6.2).

CONSTRUCTION IMPACTS AND BMPS

Approximately 7.8 acres of ground on the east and west banks would be temporarily disturbed during construction, mostly for access and staging purposes. Potential impacts to habitat areas would be short-term because project-related disturbance would be during construction only and would not change current conditions. Furthermore, vegetation that is impacted by the project will be replanted with native species.

Approximately 14.5 acres of in-channel work and/or short-term alteration (due to de-watering) would temporarily impact designated critical habitat. This work would only occur during construction and would not permanently alter the channel.

4.6.2. Endangered and Threatened Species and Species of Concern

4.6.2.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have a direct impact to a minimum of the four federally endangered fish species known to inhabit or use this reach of the Green River. Currently, there are times of the year when there is no upstream fish passage due to low water flow over the diversion. USFWS recovery efforts call for connectivity in the Green River to ensure support of species survival for spawning migration, drifting of newly produced young-of-year fish, and home-range expansion of juveniles. Terrestrial listed species are not negatively impacted with the No Action Alternative. In the event of diversion failure, indirect impacts to habitat could occur, generally associated with erosion and ground disturbance on the east and west banks of the river.

4.6.2.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

As noted in Section 4.6.1, this alternative would result in continued habitat fragmentation. The existing diversion structure has created fragmentation to some degree, and although this alternative would rehabilitate the diversion it would not provide upstream or downstream fish passage. Therefore, connectivity would not be restored to this section of Green River. This alternative would directly impact fish and wildlife habitat, due to the study area designation of critical habitat for two of the four listed endangered fish species found in the project area; this issue is provided further detail in Section 4.6.2. Impacts associated with this alternative are the same as presented in 4.6.1.3.

4.6.2.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

The proposed action has the potential to directly or indirectly impact listed species, by increasing short term suspended sediment in the action area. The project is likely to adversely affect the following endangered and threatened species: Colorado pikeminnow, Humpback chub, Razorback sucker, and Bonytail chub. The project is also within designated critical habitat for the Colorado pikeminnow and the Razorback sucker.

The proposed action may effect, but is not likely to adversely affect the Yellow-billed cuckoo. The proposed action may impact the following special status species (state-listed): Bald eagle (see Section 4.6.4), Big Free-Tailed Bat, Bluehead sucker, Burrowing Owl, Cornsnake, Ferruginous hawk, Flannelmouth sucker, Great Plains Toad, Roundtail chub, Spotted Bat, Townsend's Big-eared Bat, and the White-tailed Prairie Dog.

Areas of impact are shown in Table 4-5 and Figure 4-3 provides detail on the location of these impacts. Analysis of project effects is ongoing and a Biological Assessment is currently in development in consultation with the USFWS. Project components have been developed to enhance opportunities for

species in accordance with USFWS policy and in conjunction with the Upper Colorado River Endangered Fish Recovery Program.

CONSTRUCTION IMPACTS AND BMPS

Construction activities have the potential to impact endangered and threatened species that use the area. Indirect impacts to species could occur from vibration. To minimize turbidity and sediment mobilization during dredging and construction, silt curtains would be installed around work areas.

Fish habitat would be temporarily obstructed and degraded due to in-channel work; however, implementation of construction BMPs would minimize this potential.

The Replace In Place With Passages Alternative involves built-in mitigation opportunities. This alternative includes components that would provide downstream fish passage (stepped fish passage notch incorporates a downstream grade control design for stability and to facilitate fish passage at low flow), upstream fish passage (channel), and PIT tag readers to enhance research, monitoring, and data management opportunities. These components have been developed in accordance with USFWS policy and in conjunction with the Upper Colorado River Endangered Fish Recovery Program. The project may contribute to the continued recovery of endangered species; cumulative effects of the project along with other efforts in the vicinity is covered in Section 4.8.2.

Reestablishment of vegetation would be expected to occur within 2 years of project completion.

4.6.3. Invasive Fish Species

4.6.3.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not change the use of the existing diversion structure; therefore, this alternative would not allow the introduction of additional invasive fish species.

4.6.3.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

All action alternatives include components that provide enhancement features for fish upstream and downstream passage and monitoring. These components have been developed in accordance with USFWS policy and in conjunction with the Upper Colorado River Endangered Fish Recovery Program in an effort to provide opportunities for native fish species to compete in this segment of the Green River. Indirect impacts to invasive fish species would not be anticipated.

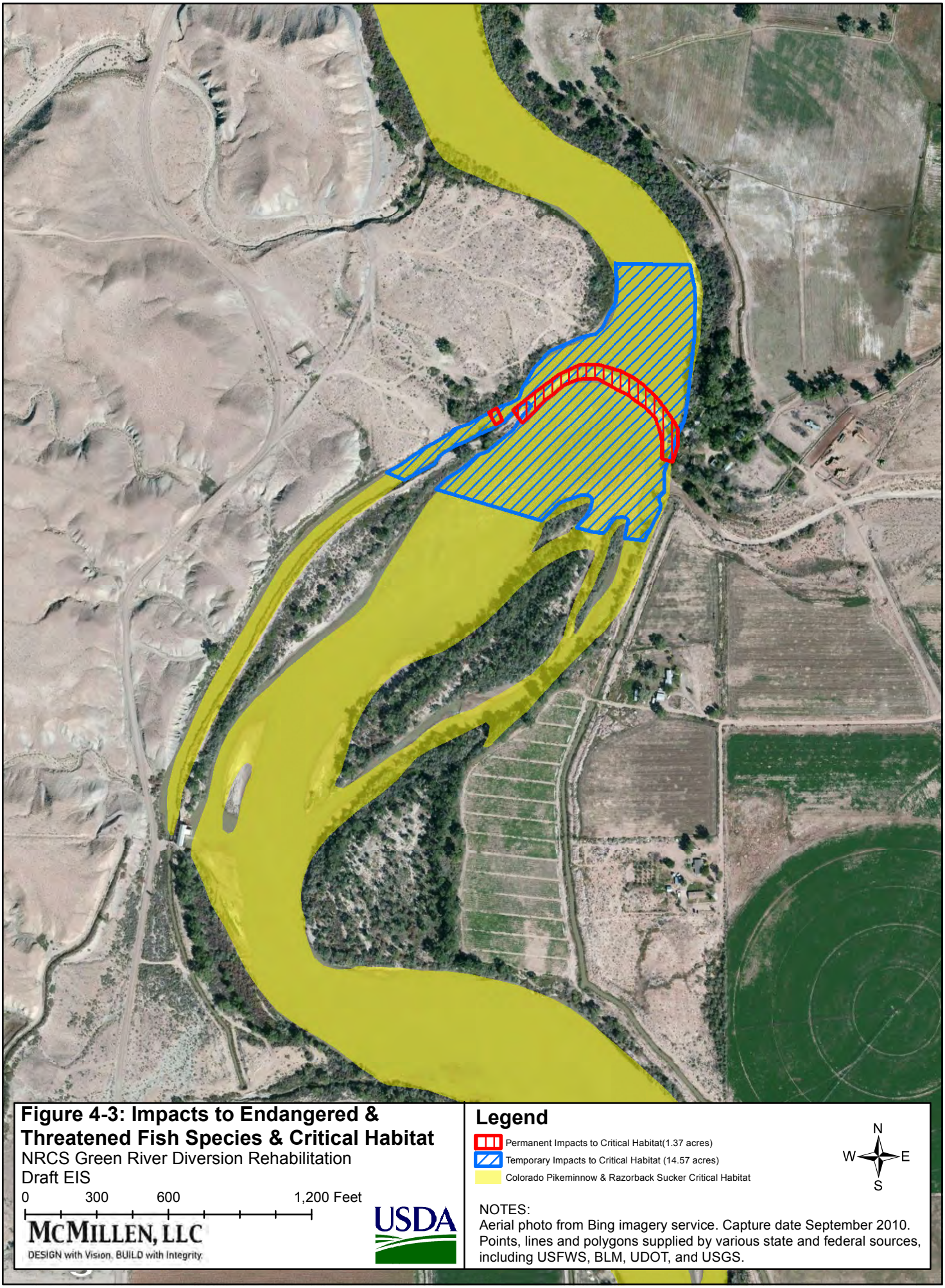

Figure 4-3: Impacts to Endangered & Threatened Fish Species & Critical Habitat
NRCS Green River Diversion Rehabilitation
Draft EIS

0 300 600 1,200 Feet

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USDA

Legend

- Permanent Impacts to Critical Habitat(1.37 acres)
- Temporary Impacts to Critical Habitat (14.57 acres)
- Colorado Pikeminnow & Razorback Sucker Critical Habitat

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NOTES:
Aerial photo from Bing imagery service. Capture date September 2010.
Points, lines and polygons supplied by various state and federal sources, including USFWS, BLM, UDOT, and USGS.

4.6.4. Migratory Birds/Bald and Golden Eagles

4.6.4.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not impact migratory birds or bald and golden eagles. However, there is a potential for the existing diversion to fail, which could have an indirect impact on trees within the riparian zone. This has the potential to result in an unintentional take of a migratory bird, nest, or egg.

4.6.4.2. Proposed Action – All Alternatives

DIRECT AND INDIRECT IMPACTS

The action alternatives would not have a direct impact on migratory birds or bald and golden eagles. The action alternatives would impact the riparian zone of the project area, which may then result in the unintentional "take" to a potential bird, eagle, nest, or egg. Large cottonwood trees occur within the riparian zone which is primary habitat for these species. Because the riparian zone is the known habitat of migratory birds and bald and golden eagles, the impact to the riparian areas would be the same for all the alternatives, and acreages of impact are shown in Table 4-3.

CONSTRUCTION IMPACTS AND BMPS

It is unlikely that clearing and grubbing activities would impact the nest sites of birds protected by the Migratory Bird Treaty Act. Temporary construction-related effects also include construction noise, increased human activity, and heavy equipment operations, all of which may temporarily disrupt wildlife activities.

During construction activities, water quality of the Green River could be impacted due to an accumulation of sediment; however, implementation of construction BMPs would minimize this potential. This could have a temporary impact on the habitat and foraging and nesting capabilities in the short term. Construction noise and vibration would be a temporary nuisance to all wildlife in the vicinity.

4.7. Human Environment

4.7.1. Socioeconomics

NRCS guidance states that NRCS should administer its programs in a way that considers environmental quality equal to economic, social, and other factors in decision-making (NRCS General Manual, Title 190, Part 410.3[b][III]). This section describes the consequences of each alternative on the social and economic resources within the project vicinity.

As part of the public participation process, the project Public Participation Plan seeks to meaningfully engage minority, low-income, and traditionally under-represented populations during the NEPA process. Documents, notices, and meetings are concise, understandable, and readily accessible to the public; notices of meetings are provided in non-English languages for targeted public audiences, affected

landowners, and stakeholders when appropriate; informational material will be made available through a variety of outlets; and, all public events will be scheduled at convenient, accessible locations.

4.7.1.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no direct impact on the social and economic resources of the area. The diversion would remain in place and function as it does currently. In the event of a diversion failure, this alternative would have an indirect impact on the properties downstream and resources that depend on water delivery from the diversion. The economic impacts of the loss of this diversion could include the loss of irrigation canals, a hydropower plant, thousands of acres of irrigated cropland, and ultimately an adverse economic impact to the area.

The city of Green River has a 21% Hispanic population that is likely reliant on the agricultural economy. No minority or low-income populations were identified immediately adjacent to the project area that would be adversely or disproportionately impacted; however, in the event of diversion failure, this population would likely be disproportionately high and/or adversely effected by a change in the agricultural economy.

4.7.1.2. Proposed Action – All Alternatives

DIRECT AND INDIRECT IMPACTS

The proposed action poses minimal impacts to social resources. Public facilities and services would be minimally impacted during construction. All of the action alternatives propose to impact an equal amount of property.

The city of Green River has a 21% Hispanic population that is likely reliant on the agricultural economy. No minority or low-income populations were identified immediately adjacent to the project area that would be adversely or disproportionately impacted by the proposed action. Therefore, the proposed action would not have disproportionately high and adverse effects on minority or low-income populations per Executive Order 12898.

4.7.2. Cultural Resources and Historic Properties

4.7.2.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not directly impact cultural resources, however would have a potential impact on cultural resources. It has been determined that the existing diversion is severely damaged. Without repair or replacement, the existing structure could fail during a flood event, possibly creating direct negative effects on historic properties in the area and downstream.

4.7.2.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Table 4-6 below summarizes the eligibility determinations made in the Cultural Resources Report and shows project effects and management recommendations for each of the sites found in the project APE.

Table 4-6. Cultural Resources Found in the APE – Summary

Site Type	NRHP Eligibility	Project Effects	Management Recommendations
East Side Canal	Eligible	Adverse effect. Reconstruction or replacement of the Tusher Diversion would impact the point of diversion and structurally alter the canal. Also impacted: fish screen at historic sluice gate.	Mitigate adverse effects through the development of a treatment plan that will become formalized in a Memorandum of Agreement (MOA).
Multi-Component Prehistoric and Historical Site	Eligible Prehistoric Component; Not Eligible Historical Component	None. Site would be avoided by project.	Avoid during construction activities to minimize and mitigate potential impacts
Historical Debris Scatter, Pits, and Road Segment	Not Eligible	None. Site would be avoided by project.	No further recommendations
Historic Inscriptions	Not Eligible	None. Site would be avoided by project.	No further recommendations
Thayne Canal/42-foot Ditch	Eligible	None. Site would be avoided by project.	Avoid during construction activities to minimize and mitigate potential impacts
Green River Canal	Eligible	None. Site would be avoided by project.	Avoid during construction activities to minimize and mitigate potential impacts
Tusher Diversion	Eligible	Adverse effect. Reconstruction or replacement of the Tusher Diversion would permanently impact the diversion to the point that it would no longer be eligible for the NRHP. Also involves east raceway and west raceway impacts.	Mitigate adverse effects through the development of a treatment plan that will become formalized in an MOA.
Hastings Ranch	Eligible	Temporary impacts during construction or rehabilitation. No long term adverse impacts currently anticipated.	Avoid during construction activities to minimize and mitigate potential impacts

NRCS has determined that the Green River Diversion (Tusher) and the East Side Canal are historic properties that would be significantly adversely affected under any of the action alternatives that are

analyzed in this DEIS. Specifically, adverse effects would result from removal of the existing diversion and replacement of the structure with a modern version.

The adverse effects would be extensive and permanent for any of the action alternatives. For the diversion, the undertaking would result in alteration of the location, design, setting, materials, workmanship, feeling, and association to such an extent that the diversion would no longer be eligible for the NRHP. For the East Side Canal, aspects of integrity such as design, materials, and workmanship that make the site eligible for the NRHP under Criterion C would be adversely affected due to reconstruction of the point of diversion. However, the canal would retain such aspects of integrity as location, setting, feeling, and association that make the property eligible for the NRHP under Criterion A.

Currently, the action alternatives being considered for reconstruction of the diversion would not result in a substantial visual impact to the adjacent historic properties and the overall historical setting. Adverse effects could occur if the design of the replacement diversion dramatically deviated from the appearance of the existing diversion.

CONSTRUCTION IMPACTS AND BMPS

Construction activities, staging of equipment and materials, and river access could result in temporary effects to the remaining sites identified during the cultural resources inventory. Adverse effects to these sites would be averted through implementation of avoidance measures, pre-selection of staging areas, and the use of alternative access routes to minimize effects to historically significant sites.

4.7.3. Hazardous Materials

4.7.3.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no direct impact on hazardous materials or HTRW sites. In the event of a diversion failure, this alternative would have an indirect impact on the properties downstream.

4.7.3.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

No sites have been identified in the immediate project vicinity that would be impacted by the project, directly or indirectly.

4.7.4. Recreation

4.7.4.1. No Action

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have no impact on recreation, public health, and/or safety. Without repair or replacement, the existing structure could fail during a flood event, possibly creating direct negative effects on recreational users and the public.

4.7.4.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

Direct impacts to recreation would primarily be associated with river recreationists and safe boat passage. This alternative would not provide boat passage; however, the project would provide the same level of passage at high lows as what exists currently; therefore, there would be no impact on the resource.

CONSTRUCTION IMPACTS AND BMPS

During construction, the river itself would be closed to the public due to the safety hazards. Signage would be posted warning boaters and fishermen of the construction activities.

4.7.4.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

Direct impacts to recreation would primarily be associated with river recreationists and safe boat passage. This alternative includes components to provide safe wet boat passage; therefore, the project has the potential to contribute to the overall enhancement of area recreation, rather than have an adverse impact on the resource.

The project would allow boating on the Green River to extend from Flaming Gorge to Lake Powell or to connect other areas of the river, such as the reach between Swasey's Beach/Boat Ramp and the Green River State Park (Figure 4-4). The inclusion of boat passage would indirectly attract additional recreationists to the project area.

CONSTRUCTION IMPACTS AND BMPS

During construction, the river itself would be closed to the public due to the safety hazards. Signage would be posted warning boaters and fishermen of the construction activities.

4.7.5. Public Health and Safety

4.7.5.1. No Action

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would have a direct impact on public health and/or safety, as it does not provide safe boat passage. Without repair or replacement, the existing structure could fail during a flood event, possibly creating direct negative effects on recreational users and the public.

4.7.5.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

Direct impacts to public health and safety would primarily be associated with river recreationists and safe boat passage. This alternative would not enhance boat passage; therefore the same level of hazard as what exists currently would remain. This alternative includes the installation of deflection log booms and boater warning signs to communicate risks to the public.

CONSTRUCTION IMPACTS AND BMPS

During construction, the river itself would be closed to the public due to the safety hazards. Signage would be posted warning boaters and fishermen of the construction activities.

4.7.5.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

Direct impacts to public health and safety would primarily be associated with river recreationists and safe boat passage. This alternative includes components to provide safe wet boat passage; therefore, the project has the potential to contribute to the overall enhancement of area recreation, rather than have an adverse impact on the resource.

The project would allow boating on the Green River to extend from Flaming Gorge to Lake Powell or to connect other areas of the river, such as the reach between Swasey's Beach/Boat Ramp and the Green River State Park. In addition, boater warning signs would be placed on both banks to ensure that river users were aware of the location of the boat passage over the diversion. This alternative includes the installation of deflection log booms to communicate risks to the public. The inclusion of boat passage would indirectly attract additional recreationists to the project area, which could then translate into further public safety risks associated with high volumes of river recreationists.

CONSTRUCTION IMPACTS AND BMPS

During construction, the river itself would be closed to the public due to the safety hazards. Signage would be posted warning boaters and fishermen of the construction activities.

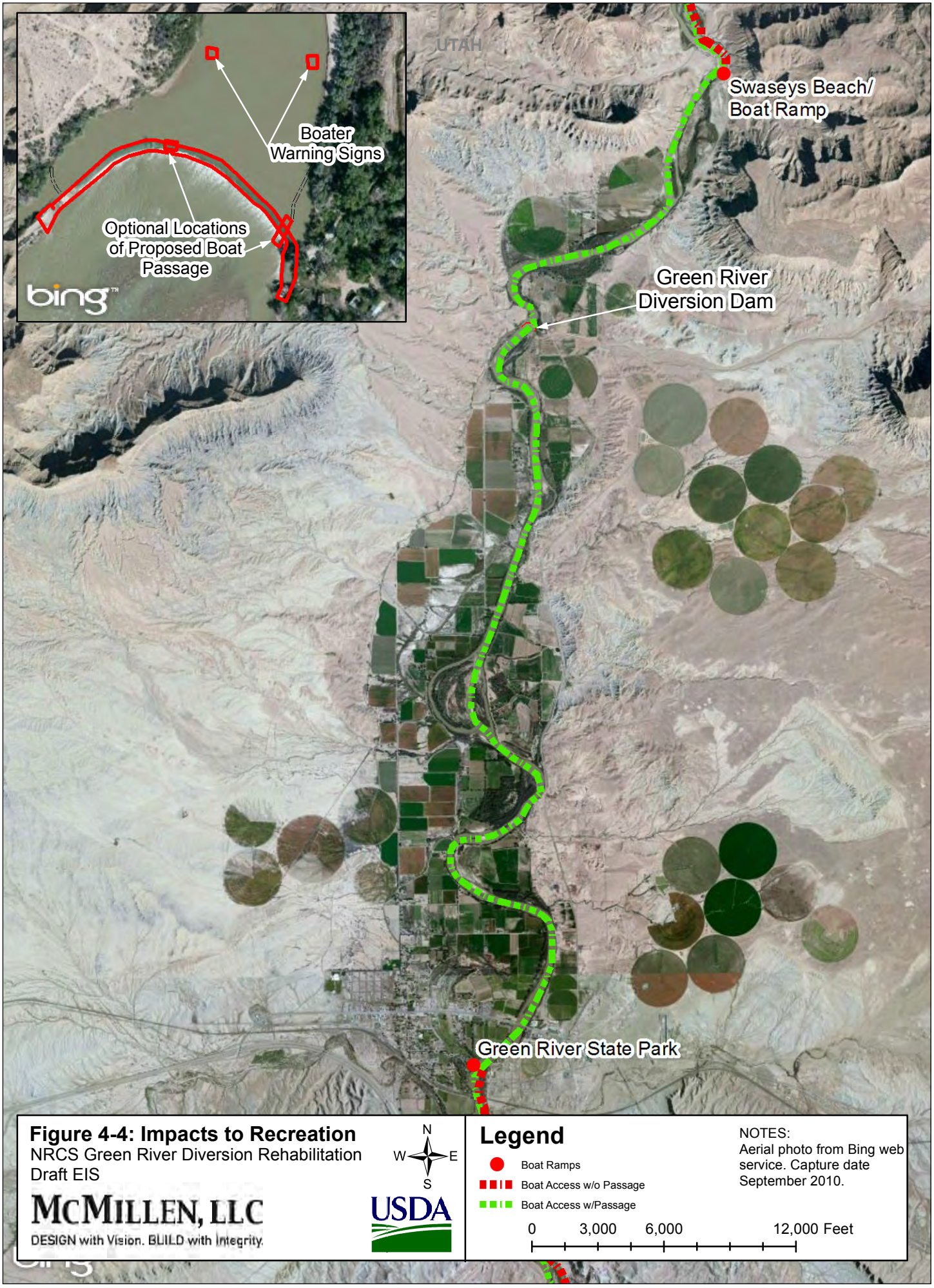

Figure 4-4: Impacts to Recreation
NRCS Green River Diversion Rehabilitation
Draft EIS

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USDA

4.7.6. Visual Quality, Aesthetics and Scenic Beauty

4.7.6.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not change the aesthetic quality of the diversion area. However, in an extreme event such as diversion failure, this alternative has the potential to alter the vegetated areas on banks and properties downstream.

4.7.6.2. Replace In Place Alternative

DIRECT AND INDIRECT IMPACTS

Long-term visual impacts to landscape quality are anticipated to be low. In order to minimize impacts to the scenic beauty of the Green River, the design of the replacement diversion would not deviate from the appearance of the existing diversion. There are no indirect impacts anticipated to visual quality.

4.7.6.3. Replace In Place With Passages Alternative

DIRECT AND INDIRECT IMPACTS

This alternative would not change the existing scenic characteristics of the study area or affect the landscape. Long-term visual impacts to landscape quality are anticipated to be low. In order to minimize impacts to the scenic beauty of the Green River, the design of the replacement diversion would not dramatically deviate from the location or appearance of the existing diversion; however, this alternative does include the installation of new, larger radial gates on the east and west ends of the diversion structure.

This alternative would improve the function of the irrigation water delivery system, which in turn supports the existing land use (agricultural production). This alternative also supports a new use of the river (boating) which has no effect on the scenic character of the area.

The new gates along with the boat and fish passage notches do change the look of the structure from various viewpoints in the vicinity. This alternative would change the way the diversion looks from the Hastings Ranch, BLM-managed property on the west side, and from the river upstream; however, the diversion and gate structures, canals, and the waterwheel are all part of the visual character of the site currently.

CONSTRUCTION IMPACTS AND BMPS

Short-term moderate visual impacts would occur at staging and laydown areas and temporary construction easements. The project area would be temporarily disturbed during construction, including in-channel work as well as approximately 8 acres for temporary staging and the use of access roads. All disturbed areas will be reseeded with native vegetation where applicable.

4.7.7. Land Use

4.7.7.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative has the potential to impact existing and future land use in the area if the diversion fails during a flood event. Without repair or replacement, the existing structure could fail during a flood event, possibly creating indirect negative effects on land uses downstream.

4.7.7.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

Land ownership within the project area would not change with the implementation of the proposed action (all alternatives).

Because the State of Utah Division of Forestry, Fire, and State Lands owns the bed of the Green River in the project area, consultation would be ongoing to obtain a Special Use Lease to construct. The repair or replacement of the diversion structure would not directly or indirectly alter land use from existing conditions.

CONSTRUCTION IMPACTS AND BMPS

During construction activities, there may be some temporary impact to area properties and/or infrastructure (utilities). The land uses would not be altered; however, temporary construction easements could be necessary in order to provide access and staging for construction equipment and resources.

4.7.8. Infrastructure

4.7.8.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative has the potential to impact infrastructure. It has been determined that the existing diversion is severely damaged; therefore, during a flood event the structure could fail, impacting infrastructure such as irrigation pumps and culverts, canals, roads, and utilities downstream.

4.7.8.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

The action alternatives would have minimal impact on existing infrastructure because the structure would be placed in the same general location as the existing diversion. These alternatives would not create an overall increase in infrastructure and the proposed action would not impact utilities.

CONSTRUCTION IMPACTS AND BMPS

Existing infrastructure may be temporarily moved or demolished and rebuilt for all alternatives.

4.7.9. Noise

4.7.9.1. No Action Alternative

DIRECT AND INDIRECT IMPACTS

The No Action Alternative would not impact any sensitive noise receptors in the area.

4.7.9.2. Proposed Action – All Alternatives

The impacts to this resource are the same for both action alternatives (Replace In Place and Replace In Place With Passages).

DIRECT AND INDIRECT IMPACTS

There are no noise-sensitive receptors in the immediate project area; therefore, the proposed action would have no impact on noise-sensitive receptors.

CONSTRUCTION IMPACTS AND BMPS

During construction activities, noise could be generated that would constitute a nuisance to the surrounding residential properties. This would be temporary in nature, and noise mitigation efforts would be utilized.

4.8. Cumulative Effects

4.8.1. No Action Alternative

No cumulative effects would be anticipated to any of the resources identified from implementation of the No Action Alternative because there would be no change to the existing environment.

Cumulative present and potential foreseeable future effects downstream can add to the effects that have taken place in the past. Sediment deposition from diversion failure would likely fill culverts and drainages in the valley, potentially creating additional flooding issues in the low-lying residential, agricultural, and commercial areas during precipitation events.

4.8.2. Replace In Place Alternative

The implementation of the Green River Diversion – Replace In Place Alternative along with the continued efforts of Trout Limited and the Upper Colorado River Endangered Fish Recovery Program would have a beneficial cumulative effect to the proposed project area in relation to fish passage, due to the project plans to repair the existing upstream passage. The fish barrier proposed downstream of the west raceway would provide a beneficial cumulative effect to ESA listed fish species in the area through an effort to reduce mortality and increase migration through the project area.

There would be no cumulative effects to waters of the U.S. including wetlands, because all wetland impacts associated with the Proposed Action will be mitigated resulting in "no net loss" of wetland functions and values. Cumulative effects are based on the net impacts (i.e., impacts left after mitigation has been applied), not gross impacts. Construction of the other projects included in the cumulative impacts analysis may potentially impact wetlands; however, these impacts would require mitigation in accordance with Section 404 of CWA and Executive Order 11990 requirements.

4.8.3. Replace In Place With Passages Alternative

The implementation of the Green River Diversion – Replace In Place With Passages Alternative along with the continued efforts of Trout Limited and the Upper Colorado River Endangered Fish Recovery Program would have a major beneficial cumulative effect to the proposed project area in relation to fish passage. The fish barrier proposed downstream of the west raceway would provide a beneficial cumulative effect to ESA listed fish species in the area through an effort to reduce mortality and increase migration through the project area.

The Replace In Place With Passages Alternative would have a positive cumulative effect on the navigability of the Green River. The enhancement of navigability in this reach of the river would likely contribute to an increase in the boating and tourism-related economy in the area.

There would be no cumulative effects to waters of the U.S. including wetlands, because all wetland impacts associated with the Proposed Action will be mitigated resulting in "no net loss" of wetland functions and values. Cumulative effects are based on the net impacts (i.e., impacts left after mitigation has been applied), not gross impacts. Construction of the other projects included in the cumulative impacts analysis may potentially impact wetlands; however, these impacts would require mitigation in accordance with Section 404 of CWA and Executive Order 11990 requirements.

4.9. Hazard Potential of Each Alternative

The NRCS General Manual states that an EIS must include a description of the hazard potential of each alternative (Title 190, Part 410.11[e]). In general terms, a *hazard* is defined as any source of potential damage, harm, or adverse health effects on humans or the environment under certain conditions or exposure or vulnerability to injury or loss. In short, a hazard can cause harm or adverse effects. *Risk* is the chance or probability that a person or an environmental resource will be harmed or experience an adverse effect if exposed to a hazard (CCOHS 2010).

This section examines the hazards associated with each alternative and the resulting risks. This section also describes how potential hazards might be mitigated and how hazards might contribute cumulatively to hazardous conditions in the project vicinity.

There are no nearby areas of high landslide potential, and recent reconnaissance of geologic hazards did not reveal any evidence of active faults, landslides, or rockfalls in the study area (Alpha Engineering Company 2010). Seismic hazards are considered relatively low as well; therefore, the most significant hazard at the site is high water flows associated with extreme storm events (100-year event).

4.9.1.1. No Action Alternative

The No Action Alternative assumes that the existing diversion would remain in place and irrigation water delivery would continue as is currently. In the 100-year storm event, the following may occur:

- Diversion failure
- Flooding from storm water flows
- Damage to property, structures, roads, and people

4.9.1.2. Replace In Place Alternative

This alternative is in the same general location and proposes a similar structure to divert water from the Green River. This alternative does not pose an increased risk nor does it involve additional hazard associated with the installation of a new structure. In general, this alternative would provide a decreased hazard potential as compared to existing conditions.

4.9.1.3. Replace In Place With Passages Alternative

This alternative is in the same general location and proposes a similar structure to divert water from the Green River. This alternative does not pose an increased risk nor does it involve additional hazard associated with the installation of a new structure. In general, this alternative would provide a decreased hazard potential as compared to existing conditions.

4.10. Consistency with Approved Regional Plans for Water Resource Management

Title 190, Part 410.11(E), of the NRCS General Manual requires an EIS to include "information identifying any approved regional plans for water resource management in the study area and a statement on whether the proposed project is consistent with such plans."

The entire study area for the Green River Diversion Rehabilitation project is located in the Green River Basin, which is part of the larger Western Colorado River Basin. The project is consistent with the regional plans for water-resource and irrigation water management in the area, which are listed below along with the basic goals or policies of each plan.

From the Utah State Water Plan (UDEQ, May 2001):

- West Colorado River Basin Plan (August 2000) - describes the current state of the basin and explores potential water-management approaches. The document does not include goals or recommended specific actions but does include a discussion about potential ways to manage the basin's water supply. Specific areas of focus include water supply, water conservation, water transfers, and efficient management of developed supplies, water development, and water quality in the Green River Basin.

- Conjunctive Management of Surface and Ground Water in Utah (July 2005) - describes the problems facing Utah's ground water resources and shows how conjunctive management offers proven methods to mitigate some of these problems and thus more fully utilize the available water supply. The document encourages professionals in the water supply industry to investigate and implement these concepts, and assists with the navigation of some of the legal and institutional requirements for actual projects. The intent of the plan is to encourage community and government leaders to facilitate projects through such actions as setting aside lands that are uniquely situated to allow underground water storage.

Utah Code:

- Utah Administrative Code R317-2 Utah Nonpoint Source Pollution Management Plan (October 2000) includes objectives in environmental protection such as (1) to conserve waters of the state; (2) to protect, maintain, and improve the quality of waters of the state for public water supplies, species protection and propagation, and for other designated beneficial uses; and (3) to provide for the prevention, abatement, and control of new or existing sources of polluted runoff. This plan specifies goals for irrigation water management, emphasizing the importance of wise and efficient use of water. Irrigation efficiency BMPs for the application and rate of use, as well as the reduction of salinity are also discussed.

4.11. Relationship between Short-Term Uses and Long-Term Productivity

The proposed action would unavoidably affect the natural resources, agricultural economy, and recreational use of the project area. Some of the effects and impacts would be positive and some would be negative. The improvements in irrigation delivery that would result from the proposed action are based on the state of Utah and NRCS comprehensive planning. The short-term impacts and the commitment of resources are consistent with the maintenance and enhancement of long-term productivity for the state and local area.

4.12. Irreversible and Irretrievable Resource Commitments

NEPA requires that environmental analysis include identification of "… any irreversible and irretrievable commitments of resource which would be involved in the Proposed Action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects this use could have on future generations. Irreversible effects primarily result from the use or

destruction of a specific resource (e.g., energy and minerals) that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural resource).

4.12.1. No Action Alternative

The No Action Alternative would involve no changes to the project area; therefore, there would be no commitment of additional resources associated with the proposed action. However, physical and financial resources would still be required to maintain the current infrastructure. Over time, these resources could resemble the commitments for the action alternatives because some of the infrastructure would eventually need to be completely replaced.

4.12.2. Proposed Action – All Alternatives

Implementing the proposed action would involve a commitment of a range of natural, physical, human, and fiscal resources. Considerable amounts of fossil fuels, labor, and construction materials (such as cement and aggregate) would be expended. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. They are not, however, in short supply and their use would not have an adverse effect upon continued availability of these resources. Any construction would also require a substantial one-time expenditure of federal and cost-share funds that would not be retrievable.

The commitment of these resources would be based on the premise that residents in the immediate area, the state, and the region would benefit by the improved quality of the diversion, the enhancement of fish passage, and opportunities for monitoring; the possibility of boat passage; and irrigation system improvement. These benefits generally are anticipated to outweigh the permanent commitment of resources.

4.13. Unresolved Issues

4.13.1. Boat Passage Location

The Replace In Place With Passages Alternative presents the boat passage component in one of two locations: the center location or the river left location adjacent to the upstream fish passage notch. The comparative analysis of these two locations is on-going and only one location will be incorporated into the final design for the project.

4.13.2. Flow Allocation Agreement

It is anticipated that an agreement regarding water flow allocations would be developed between all parties with interest in the function of the diversion in conjunction with the Operation and Maintenance Plan.

4.13.3. Cultural Resources Memorandum of Agreement and Treatment Plan

NRCS will resolve the adverse effects to the diversion and the East Side Canal through the development of a Treatment Plan. This Treatment Plan will be developed through NRCS consultation with the Utah SHPO and other interested agencies and tribes. Once the Treatment Plan is agreed upon by the consulting parties, a Memorandum of Agreement (MOA) will be executed and implemented pursuant to compliance with Section 106 of the National Historic Preservation Act. Once the MOA is signed by all consulting parties, NRCS will recommend that the Preferred Alternative be allowed to proceed to Final Design.

CHAPTER 5. CONSULTATION, COORDINATION, AND PUBLIC PARTICIPATION

5.1. Introduction

This chapter describes the public and agency coordination efforts for the Green River Diversion Rehabilitation Project. The intent of the proposed action is to implement a solution that would stabilize the existing diversion structure while ensuring water delivery to water right holders, provide fish passage upstream and downstream, and address recreational concerns.

5.2. Agency Consultation

The agencies listed in Chapter 7, Distribution were invited to comment on the project during the scoping period. Additional consultation will be performed with all interested agencies during the DEIS review period and the results of this consultation will be documented in the Final EIS.

The Proposed Action would require work within BLM property. NRCS has coordinated with the BLM (a cooperating agency) regarding the project. A temporary use permit will be required for the staging and access for the construction activities associated with the project. Consultation with the BLM will be ongoing, and once the project design has advanced further coordination will be necessary for modification of the rights-of-way and/or easements. The preliminary assessment of impacts to BLM lands and listed plant species described in this document have identified that there will be impacts from each of the Action alternatives. Further coordination with the BLM will be performed as the project progresses during final design.

The Proposed Action would require work on the bed of the Green River, within the project area, which is considered sovereign land owned by the State of Utah and managed by the Utah Division of Forestry, Fire and State Lands (a participating agency). A Special Use Lease will be required for the construction activities and the structure. Further consultation and coordination with FFSL will continue as the project progresses to ensure navigability through the Diversion.

NRCS has coordinated with Utah SHPO regarding the project under formal consultation (Utah State Antiquities Project Number: U-13-SH-0354bps). The report prepared for the project describing the results of the literature review and pedestrian survey concluded that there are cultural and historical resources within the project area. The report was submitted to Utah SHPO for a concurrence of an Adverse Effect to 2 NRHP-eligible sites, the Green River Diversion and the East Side Canal. The concurrence letter from Utah SHPO is located in Appendix D. The results of the consultation with SHPO on this project will be documented in the Final EIS.

Preliminary research and informal consultation with the USFWS (a participating agency) has concluded in the determination that the project will impact Threatened and Endangered species. A Biological Assessment will be prepared for the project describing the results of the literature review and pedestrian

survey. From that point, consultation will be formalized with the agency to provide adequate project information and mitigation commitments to develop the Biological Opinion. The results of the consultation with USFWS on this project will be documented in the Final EIS.

The Proposed Action would require work within jurisdictional waters of the U.S. A USACE Section 404 permit will be required to complete the construction activities associated with the project. Consultation with the USACE will be performed once the project design has advanced to identify dredge/fill impacts (area and volume) to jurisdictional waters. The preliminary assessment of impacts to jurisdictional waters of the U.S described in this document have identified that there will be impacts from each of the Action alternatives. Further coordination with the USACE will be performed as the project progresses during final design.

5.3. Coordination

UDAF requested financial assistance from the NRCS to mitigate flood damage incurred in 2011 through Standard Form 424 – Application for Federal Assistance in 2011. Initial coordination was conducted between the NRCS and UDAF regarding the project through the preparation of a DSR. The DSR documented the eligibility of the damaged structures for inclusion in the EWPP. NRCS, through the preparation of the DSR, concluded that the project was eligible for funding under EWPP but would require additional analysis under NEPA. Meetings were conducted with the NRCS, UDAF, and local stakeholders to discuss the project and identify potential concerns relating to the project. The results of these meetings and discussions have been incorporated into this DEIS.

5.4. Project Chronology

Table 5-1 lists the project's public outreach activities. The public was notified of each activity listed below and provided with opportunities to comment on the project.

Table 5-1. Public Outreach Activities

Date	Purpose	Type
October 30, 2012	Scoping Period Open	Comment Period Open
October 30, 2012	Scoping Meeting Notice	Scoping Notice Mailed
November 5, 2012	Scoping Meeting Notice	Posters displayed in community gathering places
November 6, 2012	Scoping Meeting Notice	Local Newspapers
November 8, 2012	Scoping Meeting Notice	Local Newspapers
November 13, 2012	Scoping Meeting Notice	Local Newspapers
November 15, 2012	Scoping Meeting Notice	Local Newspapers
November 15, 2012	Scoping Meeting	Public Meeting in Green River
November 30, 2012	Scoping Period Close	Comment Period Close

Date	Purpose	Type
May 29, 2013	2nd Scoping Period Open	Comment Period Open
May 29, 2013	Scoping Meeting Notice	Scoping Notice Mailed
May 29, 2013	Scoping Meeting Notice	Local Newspapers
May 30, 2013	Scoping Meeting Notice	Local Newspapers
June 3, 2013	Scoping Meeting Notice	Federal Register
June 4, 2013	Scoping Meeting Notice	Local Newspapers
June 5, 2013	Scoping Meeting Notice	Local Newspapers
June 6, 2013	Scoping Meeting Notice	Local Newspapers
June 12, 2013	2nd Scoping Meeting	2 Telebriefings
July 2, 2013	2nd Scoping Period Close	Comment Period Close
March 14, 2014	DEIS Public Comment Period Open	Comment Period Open
March 14, 2014	Notice of Availability, Mailings, Public Notice	Mailed, published in local newspapers, posted at library, City Hall, published in Federal Register
April 10, 2014	Public Meeting	Public Meeting in Green River
April 30, 2014	DEIS Public Comment Period Close	Comment Period Close
TBD	Final EIS Public Comment Period	Mailed, published in local newspapers, posted at library, published in Federal Register
TBD	Record of Decision	Published in Federal Register

5.5. Public Participation Plan

The *Public Participation Plan* dated October 2012 was prepared to provide effective procedures that define outreach to the general public, recreationists, local businesses, associations, stakeholders, affected landowners, and affected government agencies. The main goal of public participation is to involve a diverse group of public and government agency participants to solicit input and provide timely information throughout the NEPA review process. In order to best accomplish this, the following objectives were utilized:

- Establish ongoing, inclusive, and meaningful two-way communication with stakeholders, affected landowners, agencies, and the general public.
- Educate the public about the environmental review process and each party's role.
- Evaluate the effectiveness of public participation activities on a continual basis in order to refine the public participation plan, as necessary, and utilize the most effective techniques throughout the NEPA process.
- Document all public and government agency input.

As part of the public participation process, the plan will seek to meaningfully engage minority, low-income, and traditionally under-represented populations during the NEPA review process. As a general rule, the following principles will be adopted to support involvement of "environmental justice" populations:

- Documents, notices and meetings will be made concise, understandable, and readily accessible to the public.
- Notices of meetings will also be provided in non-English languages for targeted public audiences, affected landowners, and stakeholders when appropriate.
- Informational material will be made available through a variety of outlets.
- All public events will be scheduled at convenient, accessible locations.

5.6. Project Scoping

Project scoping questions, comments, and concerns were requested from the public and government agencies during the preliminary scoping period, both orally at public meetings and via written submittal of comments. The main goal of public participation during the scoping period was to involve a diverse group of public and government agency participants to solicit input and provide timely information regarding their concerns pertaining to the project and the proposed alternatives.

The original scoping period officially opened on October 30, 2012 and ended on November 30, 2012 for a total of 31 days. The 2nd scoping period opened on May 29, 2013 and ended on July 2, 2013 for a total of 35 days. Official comments received during the original and 2nd scoping periods are included in Appendix A.

5.6.1. Original Project Scoping Meeting

A scoping notice was prepared and sent to interested parties and regulatory agencies on October 30, 2012. The distribution list, as presented in Section 7.0, was prepared by both the NRCS and UDAF. The scoping notice gave a description of the project, location and overview, purpose and need, identified preliminary scoping issues, and requested public participation. The scoping notice also identified the location of public meetings, contact information to submit written comments, and the scoping period closure date. One public scoping meeting was conducted on November 15, 2012. Written comments could have been submitted via mail, e-mail, facsimile, or comment card, and oral comments could have been submitted over the phone or in person. There were 11 oral or written comment documents received for the Green River Diversion Project during the scoping period.

5.6.2. Second Public Scoping Meeting

Initially, it was determined that the Green River Diversion Rehabilitation Project would follow NEPA guidelines through the EA process. Comments made during the first public scoping period as well as numerous agency meetings supported the EA process. However, during consultation with the SHPO, it was determined that the diversion could be of historic importance and possibly be eligible for listing on

the NRHP. Consequently, any modification to the diversion might result in an adverse effect to the historic resource. The consequences of several alternatives (discussed in Section 4) could result in impacts to the diversion considered "significant" to cultural resources. Due to the potential for a significant resource impact, NRCS decided to prepare an EIS for the project instead of an EA. The NOI to prepare an EIS was published and a second scoping period was opened during the period of May 29, 2013 to July 2, 2013.

The second public scoping meeting consisted of two Telebriefings on June 12, 2013. One was held at 2:00 PM to accommodate agency personnel and their schedules, and one at 6:00 PM to accommodate the general public and stakeholders. Written comments could have been submitted via mail, e-mail, facsimile, or comment card, and oral comments could have been submitted via phone or in person. There were 39 oral or written comment documents received for the Green River Diversion Project during the 2nd scoping period.

5.6.3. Project Scoping Comments

All comments including those from the general public, government, landowners, and stakeholders were sent to McMillen, LLC's office in Boise, Idaho for tracking and were scanned and delivered to the NRCS during the comment period. Comments were incorporated into a matrix according to topic and each one individually addressed as presented in Appendix A. Comments were sorted into the following categories:

- Agriculture
- Boat Passage
- Construction Alternatives
- Construction Impacts
- Dam Decommission
- Dam Rehabilitation
- Electrical Barrier
- Fish Passage
- Floods
- Funding/Economics
- Habitat
- Historic Preservation
- Hydropower Plant
- Irrigation
- NEPA Process
- Permits
- Sediment
- Water Wheel

5.7. Draft EIS

Copies of the DEIS will be provided to the agencies and organizations listed in Chapter 7. In addition, a Notice of Availability is published in newspaper, sent via email, and mailed to an extensive list of private parties that has been developed throughout the process.

5.8. Final EIS (*Future*)

5.9. ROD (*Future*)

CHAPTER 6. LIST OF PREPARERS

6.1. Draft EIS Preparers

Table 6-1 lists the people who participated in the preparation of this DEIS.

Table 6-1. List of Preparers

Name	Title (Years Experience)	Education	Other
NRCS – Utah			
Norm Evenstad	Water Resources Coordinator (25)	B.S. – Geology	Utah PG
Bronson Smart	State Engineer (14)	B.S. – Civil and Environmental Engineering M.S. – Civil Engineering	Utah PE
Anthony Beals	EWP Specialist	B.S. – Agronomy	
McMillen, LLC			
Greg Allington	Project Manager/Biologist (9)	B.S – Wildlife Ecology	
Dan Axness	Engineer (21)	B.S. – Agricultural Engineering M.S. – Bioresource Engineering	
Kevin Jensen	Engineer in Training (4)	B.S – Civil Engineering	
Aimee Hill	NEPA Specialist (15)	B.S. – Environmental Health	
Browne Consulting, LLC			
Peggy Browne	Ecologist (16)	B.S. – Rangeland Ecology	
Tetra Tech			
Merri Martz	Project Manager/Biologist		

CHAPTER 7. DISTRIBUTION

A notice of availability for the DEIS will be distributed to the following government agencies/staff and organizations.

7.1. Federal Government

Bureau of Land Management
Federal Energy Regulatory Commission
National Park Service
Natural Resource Conservation Service
Bureau of Reclamation
U.S. Fish & Wildlife Service
U.S. Army Corps of Engineers
Environmental Protection Agency

7.2. Tribal Government

Ute Indian Tribe of the Uintah & Ouray Reservation, Utah

7.3. State Government

Congressman Jim Matheson
Congressman Rob Bishop
Representative Jason Chaffetz
Senator Mike Lee
Senator Orin Hatch

Bureau of Environmental Health Services
Green River State Park
State of Utah - Office of the Governor
Utah Association of Conservation Districts
Utah Department of Agriculture
Utah Department of Community and Culture
Utah Department of Environmental Quality
Utah Department of Heritage and Arts
Utah Department of Natural Resources
Utah Department of Public Safety
Utah Department of Transportation
Utah Division of Drinking Water
Utah Division of Environmental Health
Utah Division of Forestry, Fire & State Lands
Utah Division of State History
Utah Division of Water Rights
Utah Division of Wildlife Resources
Utah Division State Land and Forest
Utah Environmental Congress
Utah National Parks Council
Utah Natural Heritage Program

Utah Public Land & Policy Coordination Office
Utah Reclamation Mitigation & Conservation Commission
Utah Rivers Council
Utah School and Institutional Trust Lands Administration (SITLA)

7.4. Local Government

Emery and Grand County Bureau of Air Quality
Emery and Grand County Bureau of Environmental Health Services
Emery and Grand County Commission
Emery and Grand County Community Development
Emery and Grand County Planner
Emery and Grand County Engineering Department
Emery and Grand County Fire Marshal
Emery and Grand County Government
Emery and Grand County Health Department
Emery and Grand County Parks & Recreation
Emery and Grand County Public Works
Emery and Grand County Search & Rescue
Grand County Council
Green River Canal Company
Green River City (Mayor)
Public Works
TERT

7.5. Organizations

American Land and Leisure
Back Country Horsemen
Back Country Horsemen of Utah
Colorado Outward Bound School
Historic Preservation Commission
Living Rivers
Save Our Canyons
Sierra Club
Sportsman For Habitat, Inc.
Star Trails ATV Riders Association
Trout Unlimited
Utah Four Wheel Drive Association
Utah Snowmobile Association
Utah Wildlife Federation
Wild Utah Project

7.6. Businesses

Adrift Adventures
Adventure Bound
American River Touring Assoc.
American Whitewater

Bill Dvorak Kayak and Rafting
Canyon River Company
Canyon Voyages Adventures Company
Carbon County Recreation
Centennial Canoe Outfitters
Colorado Rivers & Trail Expeditions
Desolation Canyon Outfitters
Friendship Cruise
Holiday River Expeditions
Interstate Boater
Jacks' Plastic Welding Inc
Moab Rafting and Canoe Company
Moki Mac River Expeditions
Moki Treks, Inc.
Nichols Expeditions, Inc.
Oneway Boatworks
Pacificorp
River Runners for Wilderness
Sheri Griffith River Expeditions
SPLORE
Tag-a-long Tours
The Women's Wilderness Institute
Western River Expeditions
World Wide River Expeditions

7.7. Private Parties

The names and addresses of private parties who will receive notice of the Draft EIS are not listed in this section for privacy.

CHAPTER 8. REFERENCES

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APPENDIX A – PROJECT SCOPING

Green River Diversion Rehabilitation-Environmental Assessment Scoping Report

Green River Diversion Rehabilitation-Environmental Impact Statement Scoping Report

NRCS

Green River Diversion Rehabilitation- Environmental Assessment

Scoping Report

Final

Contract No. AG-3A75-C-10-0025
Task No. AG-8D43-D-12-0020

Dan Axness
Project Manager

December 19, 2012

McMillen, LLC

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APPENDICES

SECTION 1
INTRODUCTION

1.0 Introduction

The Natural Resources Conservation Service (NRCS) and Utah Department of Agriculture and Food (UDAF), as the project sponsor, are analyzing alternatives to repair damage to the Green River diversion structure from the late 2010 and early 2011 (2010/2011) flood events. The United States Fish and Wildlife Service (USFWS) is proposing to install a fish barrier as part of this project, through funding from the United States Bureau of Reclamation (USBOR), at the entrance to the west irrigation and hydropower plant canal to prevent Endangered Species Act (ESA) listed fish species from entering the canal and/or hydropower plant.

NRCS, as the lead federal agency, is initiating the NEPA analysis in the form of an Environmental Assessment (EA) to analyze impacts to the natural and human environment from this project. The U.S. Bureau of Reclamation (BOR) is proposing to fund the installation of the fish barrier and is a cooperating agency in the NEPA analysis. The EA will comprise of the following elements:

- Alternatives analysis of potential options for structure rehabilitation;
- Detailed analysis of resources that may be affected for each of the alternatives that may satisfy the purpose and need for the project;
- Identification of potential mitigation measures to reduce or eliminate potential impacts; and
- A plan of public participation and government agency coordination throughout development of the EA.

The participation of the public is a vital component of the project so that those who are interested in or potentially affected by proposed alternatives have an opportunity to share their concerns and provide input regarding the EA during the initial stages of the process. This Scoping Report outlines the comments received from the agencies and general public during the scoping process.

1.1 Project Purpose and Need

The Green River diversion structure was constructed in the early 1900's and has been modified over the years to maintain the structure. During the 2010/2011 flood events, flows in the Green River caused severe damage to the diversion structure compromising its structural integrity. If the dam fails water service to two irrigation canals, a historic irrigation water delivery system and one hydropower plant would be eliminated. Repairing the dam would directly result in these resources remaining open and usable. The purpose and need of the project is to maintain existing functions of the diversion dam for water delivery to irrigation canals and the powerhouse.

1.2 Scoping Goals and Objectives

The main goal of public participation is to involve a diverse group of public and government agency participants to solicit input and provide timely information throughout the NEPA review process regarding their concerns for the project and the proposed alternatives. The main goals are to 1) establish ongoing communication with stakeholders, agencies and the general public, 2) educate the public about the environmental review process and each party's role, 3) evaluate the

effectiveness of public participation activities on a continual basis and utilize the most effective techniques throughout the NEPA process, and 4) document all public and government agency input.

SECTION 2
SCOPING PROCESS SUMMARY

2.0 Scoping Overview

Scoping questions, comments and concerns were requested from the public and government agencies during the preliminary scoping period via written submittal of comments. The following summarizes the scoping process and efforts made to engage the public and government agencies.

2.1 Scoping Terms

The following terms were used during the scoping process to identify specific actions:

- Comment: a distinct statement or question about a topic or issue relating to the project.
- Comment Category: a topic to which a comment is addressed.
- Comment Document: a written version of comment(s) submitted by a commenter. One comment document may contain multiple comments.
- Commenter: an individual, organization or agency providing one or more comments.

2.2 Scoping Schedule

The following dates outline the milestones for the scoping process:

- October 30, 2012: Scoping Notice Mailed and Scoping Period Opened
- November 5, 2012: Poster Display Boards Placed in Community Gathering Places
- November 6, 2012: Public Notice Published in the Emery County Progress and Sun Advocate Newspapers
- November 8, 2012: Public Notice Published in the Moab Times-Independent Newspaper
- November 13, 2012: Public Notice Published in the Emery County Progress and Sun Advocate Newspapers
- November 15, 2012: Public Notice Published in the Moab Times-Independent Newspaper
- November 15, 2012: Scoping Meeting
- November 30, 2012: Scoping Period Closed

2.3 Scoping Notice

A scoping notice was prepared and sent to interested parties and regulatory agencies on Oct. 30, 2012. The list of recipients was prepared by the NRCS, UDAF, Utah Association of Conservation Districts (UACD), and the local Green River irrigators. The scoping notice gave a description of the project, location and overview, purpose and need, identified preliminary scoping issues, and requested public participation. The scoping notice also identified the location of public meetings, contact information to submit written comments, and the scoping period closure date. A copy of the scoping notice is attached in Appendix A. The scoping notice was also posted on the NRCS website.

Public notices were published in the Moab Times-Independent, Sun Advocate and Emery County Progress newspapers announcing the project and public meeting. Copies of the newspaper scoping notices are attached in Appendix B.

A poster display ad was placed at government buildings and various businesses and other community gathering places in the project area (Green River, Emery County and Grand County). A copy of the poster ad is attached in Appendix C.

2.4 Scoping Meeting

The primary purpose of the scoping meeting was to gather input and feedback on the project's purpose and need statement, potential alternatives for consideration, environmental issues to be addressed in the EA, methodologies to be used to evaluate impacts, and the overall public participation process. To gather as broad an audience as possible, a combined government agency and general public scoping meeting was held Nov. 15, 2012 from 6:00 PM to 9:00 PM at City Hall in Green River, Utah. The scoping meeting presentation can be found in Appendix D.

There were 34 attendees at the public meeting. Participants were invited to submit comments in writing either at the meeting or subsequently by mail, fax or e-mail during the scoping comment period. Attendance at the meeting was counted using a sign-in sheet that is located in Appendix E. Comment cards were handed out at the meeting which also provided a blank space to submit written comments.

Scoping Meeting – November 15, 2012

2.5 Scoping Mailing List

The mailing list was prepared by the NRCS, UDAF, UACD, and local Green River irrigators to inform the government agencies and general public about the scoping process for the project. A total of 69 mailings were sent to government agencies and 316 mailings were sent to the public.

SECTION 3
SCOPING COMMENTS

3.0 Scoping Meeting

The combined agency/public scoping meeting was conducted on Nov. 15, 2012 from 6:00PM to 9:00PM. There were 34 attendees at this meeting and there were two (2) written comments submitted.

The following project personnel were in attendance for the public meeting.

Name	Organization	Title
Norm Evenstad	NRCS	Water Resource Coordinator
Anthony Beals	NRCS	EWP Specialist
Chris Christiansen	NRCS	EWP Engineer
Bob Normal	BOR	Project Manager
Terry Stroh	BOR	NEPA Specialist
Roger Barton	UACD	Resource Coordinator
Thayne Mickelson	UDAF	Conservation and Resource Manager
Kevin McAbee	USFWS	Fish Biologist
Dan Axness	McMillen, LLC	Project Manager
Greg Allington	McMillen, LLC	NEPA Specialist

3.1 Written Comments

The scoping period officially opened on October 30, 2012 and ended on November 30, 2012 for a total of 32 days. Written comments could have been submitted via mail, e-mail, facsimile, or comment card.

There were eleven (11) written scoping comments received from a commenter via comment document during the scoping period for the Green River Diversion Rehabilitation project. Written comments are presented in Appendix E.

3.2 Comment Categories

Each of the comments was separated into comment categories to identify the nature of the comment. The following categories were created for scoping and are listed below. Specific comment details are listed in the Open House Comment Matrix in Appendix E.

- Fish Passage
- Boat Passage
- E-Barrier
- Sediment
- Water Wheel
- Funding
- Construction Alternatives
- Agriculture
- History

APPENDIX A

SCOPING NOTICE

USDA Natural Resources Conservation Service-Utah
Wallace F. Bennett Federal Building
125 S. State Street – Room 4010
Salt Lake City, UT 84138-1100

October 30, 2012

Dear Interested Parties:

The Natural Resources Conservation Service (NRCS), in cooperation with Utah Department of Agriculture and Food as the project sponsor, are proposing to address flood damage on the Green River diversion structure in Green River, Utah. The proposed project is located approximately 6.6 miles north of the city of Green River on North Long Road. **You are invited to attend a public meeting** where a wide range of conceptual alternatives addressing damage rehabilitation to the Green River diversion structure will be presented and discussed at the meeting.

When: Thursday November 15, 2012
Time: Formal Presentation: 6 p.m. – 6:45 p.m.
Informal Open House: 6:45 p.m. – 9 p.m.
Where: Green River City Hall
460 East Main St
Green River, Utah 84525

More project specific information is available by contacting Greg Allington (McMillen, LLC) with the project team by phone at 208-342-4214 or email at greenriver@mcmillen-llc.com.

……
……..

Environmental Assessment Introduction

The NRCS is proposing to partially fund, through the Emergency Watershed Protection (EWP) program, a project to address and reduce flood damage to the existing Green River diversion structure. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality's regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions. The project will require an environmental analysis and the environmental impacts will be documented in the form of an Environmental Assessment (EA) for the project.

Project Purpose and Need

In accordance with the rehabilitation provisions of the NRCS's EWP program, the area is eligible for rehabilitation funding due to recent flood damage in late 2010 and early 2011. The purpose of the project is to rehabilitate the structure so it continues to function as originally intended.

Public Participation

The participation of the public is a vital component of the project so that those who are interested in or potentially affected by the proposed project have an opportunity to share their comments, ideas, and concerns regarding actions during the initial scoping stage of the NEPA process. You are encouraged to attend the public meeting and express your comments, ideas, and concerns. You may also submit your

comments via letter, email or fax anytime during the public comment period. For comments to be considered and to become part of the public record for the projects, **we need to receive them by close-of-business on November 30, 2012**.

Please mail your written comments to:

Green River Diversion Rehabilitation Project
c/o McMillen, LLC – Greg Allington
1401 Shoreline Drive
Boise, ID 83702

You may also submit comments by email, phone or fax to McMillen:

Email: greenriver@mcmillen-llc.com
Phone: 208-342-4214
Fax: 208-342-4216

After receiving comments by close-of-business on November 30, 2012, the NRCS will begin reviewing the comments and reviewing conceptual alternatives for analysis in the EA. Preliminary resource concerns identified during this initial project scoping process will also be addressed in the EA.

You may also visit the project website at http://www.ut.nrcs.usda.gov/programs/EWP/index.html to check on the status of the project and download project related documents during the course of the NEPA analysis.

The project team values your feedback and encourages you to attend the open house on November 15, 2012.

Sincerely,

Bronson Smart
NRCS State Engineer

cc: Norm Evenstad – NRCS
Chris Christiansen – NRCS
Thayne Mickelson – UDAF
Roger Barton – UACD
Dan Axness – McMillen, LLC
Greg Allington – McMillen, LLC

APPENDIX B

NEWSPAPER SCOPING NOTICES

Emery County Progress and Sun Advocate

NRCS PUBLIC OPEN HOUSE

The Natural Resources Conservation Service (NRCS), in cooperation with Utah Department of Agriculture and Food as the project sponsor, are proposing to address flood damage on the Green River Diversion Structure (Tusher Wash Diversion) under the Emergency Watershed Protection program. The proposed project is located approximately 6.6 miles north of the City of Green River, Utah on North Long Road. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality's regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions within put from the public.

You are invited to attend a public scoping meeting where a wide range of conceptual alternatives addressing damage rehabilitation to the Green River Diversion Structure will be presented and discussed at the meeting.

When: November 15, 2012 - Thursday
Time: 6:00 PM to 9:00 PM
Where: Green River City Hall
460 East Main St
Green River, Utah

Interested parties may voice their comments, ideas, and concerns to the project sponsors during this meeting. Comments may also be submitted via the following methods prior to the **end of the scoping period on November 30, 2012**:

Mail: Green River Diversion Rehabilitation Project
c/o McMillen, LLC
1401 Shoreline Drive
Boise, Idaho 83702
Email: greenriver@mcmillen-llc.com
Fax: (208) 342-4216
Phone: (208) 342-4214 ext. 318

Bishop notes the outdoors groups are not talking with officials about how those lands should be managed and said this is one reason state leaders are

Tuesday that a legislative route on for the Great- has seemed out of reach.

"Congress has not passed

derness Alliance, outdoor industry and says he is n that the group wen president for help.

"Utah politicia begging for this," "Governor [Gar launched his att public lands by de federal governmen million acres of lar ing over 20 lawsuits That is not a way to sion. People's favor their businesses ar and that triggers seek protection."

A spokeswoma said the governor's contacted by anyon national monumen and opposes its cr president.

"We certainly h have another Bill proach to creating a Ally Isom said. "C was established by any expansion ough ly created by statut

Leaders of the crafted the letter to said in a conference that they don't pla changes should G yonlands National become a reality.

"Most [changes to do with resourc Korenblat said. "T leasing system no

NRCS PUBLIC OPEN HOUSE

The Natural Resources Conservation Service (NRCS), in cooperation with Utah Department of Agriculture and Food as the project sponsor, are proposing to address flood damage on the Green River Diversion Structure (Tusher Wash Diversion) under the Emergency Watershed Protection program. The proposed project is located approximately 6.6 miles north of the City of Green River, Utah on North Long Road. The National Environmental Policy Act (NEPA) and the Council on Environmental Quality's regulations at 40 CFR Parts 1500-1508 require an evaluation of potential environmental impacts associated with federal projects and actions with input from the public.

You are invited to attend a public scoping meeting where a wide range of conceptual alternatives addressing damage rehabilitation to the Green River Diversion Structure will be presented and discussed at the meeting.

When: November 15, 2012 - Thursday
Time: 6:00 PM to 9:00 PM
Where: Green River City Hall
460 East Main St
Green River, Utah

Interested parties may voice their comments, ideas, and concerns to the project sponsors during this meeting. Comments may also be submitted via the following methods prior to the **end of the scoping period on November 30, 2012**:

Mail: Green River Diversion Rehabilitation Project
c/o McMillen, LLC
1401 Shoreline Drive
Boise, Idaho 83702
Email: greenriver@mcmillen-llc.com
Fax: (208) 342-4216
Phone: (208) 342-4214 ext. 318

APPENDIX C

OPEN HOUSE POSTER DISPLAY AD

PUBLIC OPEN HOUSE

You are invited to attend a public scoping meeting where a wide range of conceptual alternatives addressing damage rehabilitation to the Green River Diversion Structure (Tusher Wash Diversion) will be presented and discussed at the meeting. Interested parties may voice their comments, ideas, and concerns to the project sponsors during this meeting.

When: November 15, 2012 - Thursday
Time: 6:00 PM to 9:00 PM
Where: Green River City Hall
460 East Main St, Green River, Utah

The Natural Resources Conservation Service (NRCS), in cooperation with Utah Department of Agriculture and Food as the project sponsor, are proposing to address flood damage on the Green River Diversion Structure under the Emergency Watershed Protection program. The proposed project will require an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA).

More information is available by contacting McMillen, LLC with the project team.

Email: greenriver@mcmillen-llc.com
Phone: (208) 342-4214 ext. 318

NRCS
Natural Resources Conservation Service

UDAF
Utah Department of Agriculture and Food

APPENDIX D

SCOPING MEETING PRESENATION

NRCS Emergency Watershed Protection (EWP) Green River Diversion Rehabilitation Environmental Assessment

Public Open House

November 15, 2012

Project Team

Natural Resources Conservation Service
(NRCS)
Lead Funding Agency

Bureau of Reclamation
(BOR)
Cooperating Funding Agency

Utah Department of Agriculture and Food
(UDAF)
Project Sponsor

McMillen, LLC
NEPA Project Manager/Concept Design

NRCS EWP Process Review

Norm Evenstad – NRCS

- Water Resource Coordinator

- Utah State: $70 million+ in 2012
- Flood, Wind and Fire Damage

NRCS - EWP Review

- Green River Diversion
- Damaged by Floods of 2011

Project Review

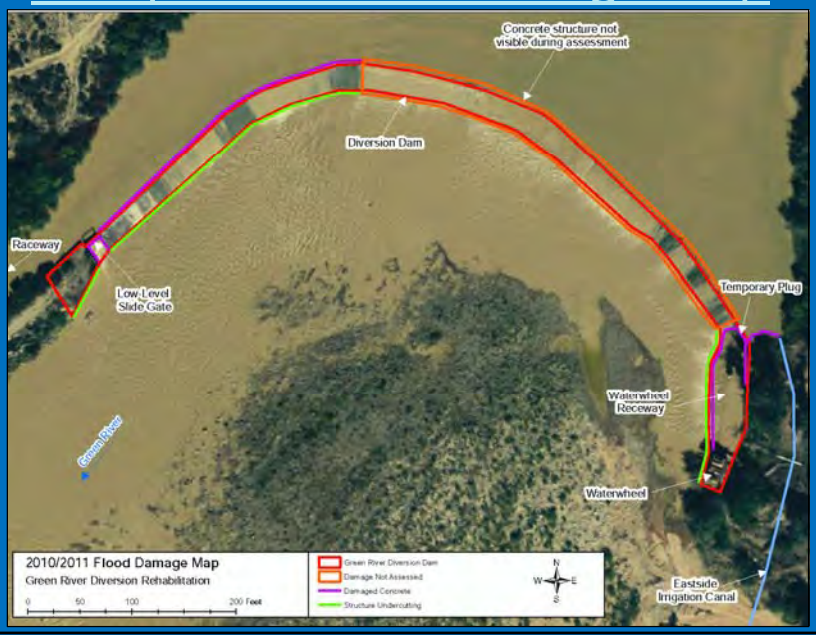
McMillen
DESIGN with Vision. BUILD with Integrity.

Dan Axness – McMillen, LLC
– Concept Design Project Manager

Project Vicinity Map

Project Overview Map

2010/2011 Flood Damage Map



Photos

West End of Diversion

East End of Diversion

Photos

East End of Diversion Damage to Waterwheel Raceway (looking u/s)

East End of Diversion Damage to Waterwheel Raceway (looking d/s)

Photos

West End of Diversion Damage to Diversion Dam (looking u/s)

West End of Diversion Damage to Diversion Dam (looking u/s)

Photos

Damage to Slide Gate West End of Dam (looking u/s)

Damage to Concrete West End of Diversion

Photos

Damage to Concrete West End of Diversion

Damage to Concrete and Entrance to Raceway West End of Diversion

Conceptual Project Alternatives

- No Action
- Rehabilitate Diversion (4 Options)
- Diversion Decommissioning
- Fish Passage Upstream/Downstream
- Boat Passage Upstream/Downstream
- Electric Fish Barrier

Conceptual Project Alternatives

- Rehabilitate Diversion Options
  - Repair Existing Diversion
  - Replace Existing Diversion
  - Replace Existing Diversion Downstream
  - Replace Existing Diversion Upstream

Electric Fish Barrier

- Deter fish from swimming down powerhouse and irrigation canal raceway

EXAMPLE

Fish Passage

- Endangered and Threatened Fish Species
- Downstream: Notches in Dam
- Upstream: Passage System
- Electronic Tag Reader


Razorback Sucker


Colorado Pikeminnow


Humpback Chub


Bonytail

National Environmental Policy Act

McMILLEN
DESIGN with Vision. BUILD with Integrity.

Greg Allington – McMillen, LLC
– NEPA Project Manager

National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190) and the Council on Environmental Qualities regulations at 40 CFR Parts 1500-1508

NRCS NEPA

- Environmental analysis required for major federal actions.
- The NRCS is the funding agency for the diversion dam rehabilitation project (75%).
- The project sponsor provides the remaining 25% cost-share for the diversion dam rehabilitation project.

BOR NEPA

- Upper Colorado River Endangered Fish Recovery Program
- The BOR is the funding agency for the electric fish barrier project (100%)
- The US Fish and Wildlife Service is providing technical oversight of the barrier

NEPA Requirements

- Environmental Assessment (EA)
  - NRCS and BOR NEPA requirements
  - Analysis looks at potential impacts to the natural and man-made environment

NEPA Requirements

- NEPA Process
  - Scoping
    - Express initial concerns and suggest alternatives to be considered
  - Draft EA
    - Public review of alternatives and environmental impacts
  - Final EA
    - Proposed alternative published to public
  - Finding of No Significant Impact (FONSI)
    - Project approval by NRCS and BOR

Typical Scoping Concerns

- Project Purpose and Need
- Design Alternatives
  - Including a No-Action Alternative
- Natural Environment
- Man-made Environment
- Mitigation

Scoping Comments

- Formal comments may be submitted by:
  - Email
  - Written Letter
  - Comment Card
  - Oral

- Scoping Report: Summarizes issues, alternatives and concerns from the public

Schedule

- NEPA Environmental Assessment
  - Start: September 2012
  - **Public Scoping Comment End: Nov. 30, 2012**
  - Draft EA Public Comment: March 2013
  - FONSI: Late Summer 2013
- Construction
  - Start: Late Fall 2013
  - End Early Spring 2014

NEPA Contact Information

- Please contact Greg Allington with McMillen project with questions and comments:

Phone: 208-342-4214

Fax: 208-342-4216

Email: greenriver@mcmillen-llc.com

Address: 1401 Shoreline Drive
Boise, ID 83702

Informal Questions

???

APPENDIX E

COMMENTS AND SCANNED SIGN-IN SHEETS

Commenters and Commenter Reference Numbers

Commentor #	Name	Organization	Phone	Address	City	State	Zip	Email	Comment Document
1	Kathy Ryan		[redacted]						Comment Card
2	Thayne Mickelson	UDAF							Comment Card
3	Dan Harrison								Comment Card
4	Kirk Dunham								Comment Card
5	Julie Zwahlen								Email
6	Penny Riches								Email
7	Von Bowerman								Email
8	Pat Brady								Email
9	Kelly Dunham								Email
10	John Weisheit	Colorado Riverkeeper							Email
11	Chet D. Hunt								Email

Commenters and Commenter Reference Numbers

Comment Category	Comment	Commenter
Boat Passage	Don't Do	1
	Boat passage not needed, boat ramps up and downstream of dam	9, 11
	Government focusing on small sector of private boating so companies can get money, focus on what benefits the majority, not private companies	3
	Create boat ramp upstream of dam for boaters	3
Fish Passage	Concentrate on fish flow	1
	Did the current dam cause extinct/endangered fish species?	3
E Barrier	Maintenance, operations and liability directly to BOR and F&WL, not canal, conservation or local landowners	2
Sediment	Any alternative would still require a sluicing system, at high flows the gates will be left open 24/7 and low flows only bi-weekly	3
	Add gates by the pump house to remove sediment from the raceway quicker	7
	Large gates should be added so sediment can be washed downstream	7
Water Wheel	The water wheel should receive it's 60cfs at the height of the dam and with the dam having a matched curve to fit the water wheel to maintain energy flows	7
	Thaynes' sluicing doing more good before the generator than all smaller gates downstream	3
Funding	Spend the money where it benefits the most	3
	Do the dam with the funds on hand	4
	Fulfill other's wishes when funds become available	4
	The Bureau of Reclamation should be consulted to provide further funding opportunities via the WaterSMART	10
	Stay within grandfather clause with the fish protection expenses, cannot have any changes that will burden the Green River Canal Co.	7
	Comparative financial analysis of diversion dam vs. pumping station	10
Construction Alternatives	Replace existing dam or build new one downstream	3
	Green River needs to have their own dam, because they already have the rights.	5
	Power turbines should be added to the dam to supply power to Green River	6,7,11
	Desilting basin could be built above the flood plain to reduce cause of sediment removal and reduce wear to water works and sprinklers	10

Construction Alternatives	The City of Green River should pursue a hydro-power plant adjacent to the dam with the ability to expand into nuclear power in the future	8
	A pumping station would include saving from protecting the overall investment from the damages that may be caused by a maximum flood event, reduce fish mortality and drift wood snag	10
	Intermittent overflow from floods on a raised dam height can be handled by a raceway that can compensate for the increased height	7
	Repair existing dam only if it would remain effective, secure and stable	9
	Combine fish passage, boat passage and E-Barrier at the west side of raceway, add 5 gates downstream of the 125ft E-Barrier to flush sediment, the passage can also be used as a place to skim trash	7
	Widen the raceway to 75ft	7
	Include a pumping station alternative with the goal of decommissioning the current dam	10
	Replace the dam and move upstream away from the Tusher Wash drainage	10
Agriculture	Farms upstream can sustain flooding if water level was raised too much.	9
History	The Green River has experienced flood events far exceeding the 2011, 43,700 cfs flood and should be built to withstand 19th century flows projected at 100,000-300,000 cfs	10

NRCS

NRCS Green River Diversion Rehabilitation
Environmental Assessment

McMILLEN
DESIGN with Vision. BUILD with Integrity.

UDAF

Public Scoping Meeting Sign-In Sheet

November 15, 2012

Name	Phone	Address	Email
Von Bowerman	[redacted]	[redacted]	[redacted]
Norm Evenstad	[redacted]	[redacted]	[redacted]
Tony Beals	[redacted]	[redacted]	[redacted]
Thayne Mickelson	[redacted]	[redacted]	[redacted]
JOHN WEISHEIT	[redacted]	[redacted]	[redacted]
ED WHICKER	[redacted]	[redacted]	[redacted]
Terry Stroh	[redacted]	[redacted]	[redacted]
Bob Norman	[redacted]	[redacted]	[redacted]
Pat Brady	[redacted]	[redacted]	[redacted]
Randy W Tucker	[redacted]	[redacted]	[redacted]

NRCS

NRCS Green River Diversion Rehabilitation
Environmental Assessment

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UDAF

Public Scoping Meeting Sign-In Sheet

November 15, 2012

Name	Phone	Address	Email
Cynthia Ryan	[redacted]		
Char D. LuptaiN	[redacted]		
NANCY DUNHAM	[redacted]		
Lee Thayn	[redacted]		
Randy Erwin	[redacted]		
Judy Ann Scott	[redacted]		
Robert D Scott	[redacted]		
Diane Mayfield	[redacted]		
LEON MAXFIELD	[redacted]		
Robert C Steuer	[redacted]		

NRCS

NRCS Green River Diversion Rehabilitation
Environmental Assessment

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UDAF

Public Scoping Meeting Sign-In Sheet

November 15, 2012

Name	Phone	Address	Email
Robert Quist	[redacted]		
Kelly Dunham	[redacted]		
Rie Schmidt			
LANCE ERWIN	[redacted]		
Jason Johnson	[redacted]		
Bo Harrison	[redacted]		
[illegible]	[redacted]		
Eugene Swalberg	[redacted]		
Bruce Nelson	[redacted]		
[illegible]	[redacted]		
Chris Dunham	[redacted]		

NRCS

NRCS Green River Diversion Rehabilitation
Environmental Assessment

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UDAF

Public Scoping Meeting Sign-In Sheet

November 15, 2012

Name	Phone	Address	Email
Dan Harrison	[redacted]		
Greg Vetere	[redacted]		
Roger Barton	[redacted]		
Wayne Urie	[redacted]		
Greg Allington McMillen, LLC	[redacted]		
Dan Axness McMillen, LLC	[redacted]		

Commenter #1

NRCS

NRCS Green River Diversion Rehabilitation Environmental Assessment .

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Public Scoping Meeting Comment Card

November 15, 2012

Name: Kathy Ryan

Address: [redacted]

Email:

Phone:

Comments:

I think don't do a boat passage in the dam concentrate on fish flows.

You can also provide comments by emailing them to greenriver@mcmillen-llc.com, faxing them to 208-342-4216, or by calling 208-342-4214.

Commenter #2

NRCS

NRCS Green River Diversion Rehabilitation
Environmental Assessment

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IDAF

Public Scoping Meeting Comment Card

November 15, 2012

Name: Thayne Mickelson

Address: [redacted]

Email:

Phone:

Comments:

E barrier Maintenance + Operations as well as liability clearly stated as the responsibility (with signature of acceptance through contract or agreement) of the F+WL and BOR with no liability to canal, conservation districts or local landowners

You can also provide comments by emailing them to greenriver@mcmillen-llc.com, faxing them to 208-342-4216, or by calling 208-342-4214.

Commenter #3

NRCS

NRCS Green River Diversion Rehabilitation Environmental Assessment

Public Scoping Meeting Comment Card

November 15, 2012

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IDAF

Name: Dan Harrison

Address: [redacted]

Email:

Phone:

Comments:

Fish issues: The existing diversion dam is over 120 years old. How is it all the endangered fish are still alive when no special consideration was given to protecting these fish? Are there any extinct species of fish that went extinct because of the dam? Most fish migrate up stream to spawn in the spring when high water is present. Could this be why these endangered fish continue to exist- they can move upstream without any special Dam modifications? Build the dam to last let nature adjust!

Boat issues: This should be a dead issue. Since when does the gov. care about providing a living for private group. River trip companies are in it for the money. Boaters are only on the river for about 5 months out of the year. during 3 of those months the water flow is too low to use below the dam. Boaters have never had use of this area of the river, why now? The extra money spent on the this small, select group of people does not give the tax payer a very good pay back.

You can also provide comments by emailing them to greenriver@mcmillen-llc.com, faxing them to 208-342-4216, or by calling 208-342-4214.

You can't be everything to everybody. Spend your money where it benifits the most.

over

Commenter #4

NRCS

NRCS Green River Diversion Rehabilitation Environmental Assessment

McMILLEN
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UDAF

Public Scoping Meeting Comment Card

November 15, 2012

Name: Kirk Dunham

Address: [redacted]

Email:

Phone:

Comments:

I believe we need to repair/ modify the existing structure for the following reasons:

#1 It is a proven design. It has served 106 years. If it weren't for the bureaucratic encumbrances the community would have repaired it already.

#2 We don't want to incurr a large debt to pass on to water users for future generations. I resent the remark that the farmers are un able to do it themselves, they built it themselves 106 yrs ago. My son is an engineer with the Bureau of Reclamation in Grand Junction office, He has talked with his Uncle Chris about this extensively. If a simple design can be developed it could be done with the funds

You can also provide comments by emailing them to greenriver@mcmillen-llc.com, faxing them to 208-342-4216, or by calling 208-342-4214. over

on hand.

Draw in options for everyone - wishes should funds become available.

Lets get it Done

Kirk Durham

Commenter 5

From: greenriver@mcmillen-llc.com on behalf of [redacted]
To: greg.allington@mcmillen-llc.com
Subject: Green River
Date: Monday, November 26, 2012 11:43:16 AM

Green River Need to have their own dam for power since they already have the rights to it first. Not somebody else coming in to do one.

Thanks
Julie Zwahlen
[redacted]

Commenter 6

From: greenriver@mcmillen-llc.com on behalf of [redacted]
To: greg.allington@mcmillen-llc.com
Subject: green river diversion project
Date: Tuesday, November 27, 2012 3:30:38 PM

Green River Diversion Project
The diversion dame does need to be replaced and I would love to have power turbans installed for the purpose of producing power. This could be a good way to help pay for keeping the dame updated and do repairs,
Penney Riches
Green River, Utah

Commenter 7

From:	Von Bowerman
To:	Dan Axness
Subject:	Re: FW: Draft email to project team - Green River/Tusher Wash
Date:	Sunday, November 25, 2012 8:28:34 AM

Hi Dan

The public meeting on Nov. 15, 2012 went well. Good work conducting the meeting.
These comments are my own and are not voted on by the Green River Canal Board.

1) The most important issue is to stay in the grandfathered clause with the fish protection expenses. We can not have any changes that will put the burden to the G.R.Canal Co., or any water rights before 1988 date.

2) Low water height, to raise the diversion dam a foot has a long list of benefits. With the only down fall is the high water level that only happens about every ten years and this can be handled with by having a over flow area along the raceway bank on the green river side that is long enough to compensate for the increased height.

3) The water wheel has first right to Its 60 C.F.S.,it needs a slot the will let out that flow rate at a low river level. But i think that the water wheel would work best if the wheel receives the 60 c.f.s.at the height of the dam and had a curve that matched the wheel in order to keep the energy from the water it is getting, put to better use. If the people owning the water wheel will agree to receiving the 60 c.f.s at a higher level it would be better for everybody, but that is not our problem, just the slot at the dam.

4) Sediment up stream of the dam needs to be able to be flushed down stream at some point in time when the sediment gets buildup, like right now. So some large gates that could be opened in low river flow to accomplish letting the sediment wash down river. Dropping the sediment out first in the river and having the raceway be the second place to catch sediment , the canals be the last place to have to deal sediment would be a big improvement.

5) E-Barrier, gates, trash skimmer, boat passage, and fish passage on the west side at the head of the race way will work best if combined together. A) The E-Barrier needs to be long enough, so the flow is slower for the fish to get away easier. Also it can not hinder the flow into the raceway. B) If the e-barrier was 125 feet long and we put five, 25 foot radial gates a few feet up stream of the e-barrier, this would work as gates to the raceway and then we could flush the sediment off of the e-barrier by opening one gate at a time to remove sediment that will get build up. Also, we could use the same radial gates as the skimmer for trash coming down the river by lowering the radial gates a foot or so down in the top of the water. C) Having the boat/fish passage in line with the e-barrier, so the slot in the dam for the boat/fish can double as a place for the trash from the skimmer to pass over the dam easier. D) Sediment collected in the raceway needs to be handled faster when we need to flush it out. So if we had a large gates placed down by the pump house, this would help in removing sediment in the raceway, also when we have a flooding problem this gate would help relieve water height passing over the dam. In 2011 the small radial gates that we have now do not come clear out of the water and have more of a problem getting plugged up. That also makes them a lot harder to clean trees and other trash away from the gates.

6) I feel the raceway needs to be wider, from 50 feet to 75 feet at least down to where the hill starts becoming a issue. Now the 50 foot structure with the 8 gates is a bottle neck in the flow we need. In 2011 flooding, the 8 gate structure became plugged with trees and junk that came from the river, this caused the dam to have more flow going over it, that added to more flooding problems up river. How ever if the trees and trash was not caught at the 8 gates it would of plugged up are small radial gates at the pump house. That could of been even a bigger problem, if the raceway may of not held the extra pressure from the water height in the raceway. This is also a benefit to having a large gate at the pump house area to handle more water during flooding times.

Please let me know if you got this e-mail. Thanks Von

Commenter 8

From: greenriver@mcmillen-llc.com on behalf of [redacted]
To: greg.allington@mcmillen-llc.com
Subject: power plant addition
Date: Thursday, November 29, 2012 9:59:03 AM

Hello,

Since our meeting it has been brought up that the City of Green River should pursue putting
in a hydro-power plant along side the dam.

Therefore, I would appreciate it if you also draw up plans that would include a power plant
suitable to sustain our town and projected growth with the Nuclear Power plant addition.

Any questions, please feel free to write or call.

Sincerely,

Pat Brady
Mayor, City of Green River
[redacted]

Commenter 9

From: kelly dunham
To: greg.allington@mcmillen-llc.com
Subject: Green River Diversion Dam Comments
Date: Thursday, November 29, 2012 10:39:46 AM

Greg,

I would like to send an official comment concerning the improvements to the GR Diversion Dam.

I am a local farmer/water user and commercial river rafter.

I have talked with fellow river rafters along with local jet boat operators and everyone agrees that there is no need for "up stream" travel for any water crafts. As long as there is some kind of slot for down stream floating that is sufficient. No need to spend much additional time or funds.
When the river levels are "low" (say below 3-5,000 cfs) there are too many rocks down stream of the dam for any water craft to even access the dam area. In the event of a rescue situation, boats can launch from the Swasey's boat ramp up stream or from the Green River State Park down stream.

Another concern that I have would be to maintain the current up stream water level. The farms up stream from the diversion dam could sustain flooding if the water level was raised much.

My vote would be to repair the existing dam if it would remain effective, secure, and stable, instead of replacing it.

Thank you for your concerns and effort with this project.
Feel free to email or call me if you have any questions.

Kelly Dunham
[redacted]

Commenter 10

From:	John Weisheit
To:	greenriver@mcmillen-llc.com; greg.allington@mcmillen-llc.com; dan.axness@mcmillen-llc.com
Cc:	John Weisheit; Terence Stroh; Kevin McAbee
Subject:	Scoping for Green River Diversion Rehabilitation Project
Date:	Friday, November 30, 2012 2:52:52 PM

November 30, 2012

Green River Diversion Rehabilitation Project
c/o McMillen, LLC – Greg Allington
1401 Shoreline Drive
Boise, ID 83702
Email: greenriver@mcmillen-llc.com
Phone: 208-342-4214
Fax: 208-342-4216

Re: Scoping for Green River Diversion Rehabilitation Project

Dear Mr. Allington,

This letter is submitted by Living Rivers and Colorado RIverkeeper, which is based in Moab, Utah. Our organization works on many issues related to water resource management in the Colorado River basin that is shared by people and wildlife in seven states and Mexico.

INTRODUCTION

This diversion dam was built in 1906 and originally constructed of wood cribs filled with large rocks. In 1936 the diversion dam was capped with a concrete slab about 12 feet wide. The components of the facility include a water wheel on the east side, a gravity-fed canal on the west side, and a pumping station and power plant on the west side.

The snowmelt of 2011 damaged the diversion dam and water works and the dam is thus slated for rehabilitation or replacement. There are concerns about reducing the "take" of endangered fish, and creating a passage for boats to improve navigation, and to reduce the build-up of driftwood snags and trees during the annual snow melt, or summer cloudbursts.

The preferred action would appear to include the repairing of the dam, install a boat passage, and install an electric fence to reduce mortality of

endangered fish. It is not arbitrary to state that the status quo operations of the diversion dam are not in the public interest, as it relates to protecting endangered fish and preventing navigation accidents.

GEOMORPHIC AND HYDROLOGIC CONCERNS

The peak flow for 2011 occurred on June 14 and the discharge was 43,700 cubic feet per second (cfs). Since the diversion dam has endured higher floods in the past, such as the 1917 peak of 65,500 cfs, it is correct to provide a solution to this aging infrastructure problem. However, even with a new or repaired diversion dam, it must be appreciated that the 20th century was generally kind when it came to large flood events. The 19th century actually had more extremes of hydrology and with greater frequency.

For example, it is generally accepted that a flood of 100,000 cfs flowed through the Gunnison Valley in 1884, following the eruption of Krakatoa in Sumatra. When it was decided to build Hoover Dam, the spillways were designed to accommodate the flood volume of the 1884 snowmelt at that location. The volume of that flood was determined by measuring the height of the driftwood that accumulated on the margins of the river channel (approximately 300,000 cfs). On the Colorado River above the Confluence with the Green RIver, the flood of 1884 was measured by gages below Grand Junction and the peak flow was determined to be 125,000 cfs.

According to various pioneer diaries (especially John Doyle Lee), a regional storm lasted 44 days from December 1861 to February 1862, and though the total yield of this storm is not yet known, the driftwood snags from this flood were photographed in Cataract Canyon by John Wesley Powell during his second expedition in 1871. The photograph was matched in the 1990's and the location of the camera station indicates that the combined flow of the Green and Colorado rivers was at least as high as the flood of 1884, and possibly higher. Slack water deposits were analyzed in Cataract Canyon by the University of Arizona in the summer of 2012. Unfortunately the analysis of the data has not yet been finalized; perhaps in a few more months the data can be shared with the public.

It is also generally accepted, anecdotally, that the snowmelt that followed the 1816 eruption of Mt. Pinatubo in Sumatra ("the year of no summer"), had at peak flow that was probably greater than the flood of 1884.

This information is useful for three reasons: 1) the 20th century escaped the consequences of a 100-year flood, but the 19th Century had at least three 100-year events; 2) the frequency and magnitude of a 100-year flood event is poorly understood (but improving) in the Colorado River basin; 3) it is likely that a flood(s) of 100,000 cfs or greater can be expected in the lifetime of this diversion dam and it should be properly constructed to withstand such volumes of water.

To better understand the nature of probable maximum floods in the Colorado River basin, please refer to the following publication (and references): "The Moab Mill Project: A technical report towards reclaiming uranium mill tailings along the Colorado River in Grand County, Utah. 2005." http://www.riversimulator.org/Resources/Hydrology/MoabMillProject.pdf

The other concern is the location of the diversion dam near the mouth of Tusher Wash. The debris flow (gravel bar) directly below the dam indicates that a massive cloudburst in the East Tavaputs Plateau (Book Cliffs) could create damaging debris flows from the Tusher Wash drainage. It is recommended that should the dam be replaced, that the location is moved further upstream and out of harms way.

PUMPING STATION ALTERNATIVE

An economic analysis should be presented with the goal of weighing the costs of the water delivered via diversion dam, versus the costs of water delivered via pumping station, and with the goal of eliminating this low-head dam altogether and combining this alternative with the dam decommissioning alternative.

The expenses of dam construction would include (not a conclusive list): the building of the dam (or rehabilitating the existing dam), demolition of the old dam (or not), the cost of repairs or replacement from damages caused by a probable maximum flood, long-term maintenance costs, endangered fish protection costs, and other such expenses.

The expenses of a pump station would include (not a conclusive list): removal of the dam, construction of screened intakes and pumps on both sides of the river, the cost of electricity, the cost of a pipeline to deliver water to the irrigation ditches and the Thayn Hydroplant, the cost of land purchases or exchanges, and other such expenses.

The benefits of a pump station, provided the pump station is perched above the floodplain, would include savings from protecting the overall investment from the damages incurred by a probable maximum flood, reduction of fish mortality and driftwood snags.

Perhaps a desilting basin could also be built above the floodplain, to reduce the cost of sediment removal in the ditches, and to reduce wear to water works and sprinklers.

We would also recommend that the Bureau of Reclamation be consulted to provide further additional funding opportunities for the project via the WaterSMART program, or other similar community investment programs.

Thank you for this opportunity to provide information and possible alternatives for this project. Please do not hesitate to contact me if you have any questions or concerns.

Sincerely yours,

/s/ John Weisheit

Living Rivers
Conservation Director
Colorado RIverkeeper
[redacted]

Commenter 11

From: greenriver@mcmillen-llc.com on behalf of Chet Hunt
To: greg.allington@mcmillen-llc.com
Subject: Green River Diversion Rehabilitation Project
Date: Saturday, December 01, 2012 9:09:46 AM

To Whom It May Concern,

The dam should be put in the same spot. It's already the right level for east and west side irrigation canals. A place for the boats to come over is not neccesary because of the boat dock just above the dam, and there is a boat dock just below the dam. I think that turbance should be put in for power generation for the city of Green River at the time of the rebuilding. The little city's power bill is just below $100, 000 a year, and the city should have done that 100 years ago when the dam was put in the first time.

Chet D. Hunt

NRCS

Green River Diversion Rehabilitation – Environmental Impact Statement

Scoping Report

Final

Dan Axness
Project Manager

July 16, 2013

McMILLEN, LLC

TABLE OF CONTENTS

APPENDICES

SECTION 1
INTRODUCTION

1.0 Introduction

The Natural Resources Conservation Service (NRCS) and the Utah Department of Agriculture and Food (UDAF), as the project sponsor, are analyzing alternatives to repair damage to the Green River diversion structure from the late 2010 and early 2011 (2010/2011) flood events. The Upper Colorado River Endangered Fish Recovery program (Recovery Program) is proposing to install a fish barrier as part of this project at the entrance to the west irrigation and hydropower plant canal to prevent Endangered Species Act (ESA) listed fish species from entering the canal and/or hydropower plant. The United States Fish and Wildlife Service (USFWS) and the United States Bureau of Reclamation (USBOR) are representing the Recovery Program by providing technical oversight of the fish barrier design and installation.

In August 2012, NRCS, as the lead federal agency, initiated the National Environmental Policy Act (NEPA) analysis in the form of an Environmental Assessment (EA) to evaluate potential impacts to the natural and human environment from this project. An initial project scoping period for the elements to be addressed in the EA was opened for 32 days (October 30 through November 30, 2012). A public meeting attended by 34 participants was held November 15, 2012 to gather input and feedback on the project's purpose and need statement, potential alternatives for consideration, environmental issues to be addressed, methodologies to be used to evaluate impacts, and the overall public participation process. Eleven written comments were received and were included in the 1st Scoping Report titled *Final Green River Diversion Rehabilitation – Environmental Assessment Scoping Report* issued December 19, 2012.

Following the first scoping period, further consultation was performed with the Utah State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act. NRCS determined that the dam is 90+ years old and may be eligible for listing on the National Register of Historic Places. Any modifications to the dam may be considered an "adverse effect", which may make it ineligible for listing after rehabilitation. Some of the impacts to the diversion dam from the rehabilitation alternatives may be considered "significant" to cultural resources and as a result, NRCS has decided to prepare an Environmental Impact Statement (EIS) for the project instead of the previously-proposed EA. The EIS will comply with the Council on Environmental Quality's regulations at 40 CFR Parts 1500-1508, which require an evaluation of potential environmental impacts associated with federal projects and actions.

Participation of the public is a vital component of the project so that those who are interested in or potentially affected by proposed alternatives have an opportunity to share their comments, ideas, and concerns regarding actions during the scoping stage of the NEPA process. To provide the public with an opportunity to comment on the preparation of the EIS and a second opportunity to comment on the overall project, NRCS opened a second public scoping period. The second scoping period was opened from May 29, 2013 and closed on July 2, 2013. This EIS Scoping Report presents the comments received from the agencies and the general public during the 2nd scoping period.

1.1 Project Purpose and Need

The Green River diversion structure was constructed in the early 1900s and has been modified over the years to maintain the structure. During the 2010/2011 flood events, flows in the Green

River caused severe damage to the diversion structure, compromising its structural integrity. If the dam failed, water service to two irrigation canals, a historic irrigation water delivery system, and a hydropower plant would be eliminated. Repairing the dam would directly result in these resources remaining open and usable. The purpose of the project is to rehabilitate the existing diversion dam. The need for the project is to maintain existing functions of the diversion dam for water delivery to irrigation canals and the hydropower plant's powerhouse.

1.2 Scoping Goals and Objectives

The main goal of public participation is to involve a diverse group of public and government agency participants in order to solicit input and provide timely information throughout the NEPA review process regarding their concerns about the project and the proposed alternatives. The main goals are to (1) establish ongoing communication with stakeholders, agencies, and the general public; (2) educate the public about the environmental review process and each party's role; (3) evaluate the effectiveness of public participation activities on a continual basis and utilize the most effective techniques throughout the NEPA process; and (4) document all public and government agency input.

SECTION 2
SCOPING PROCESS SUMMARY

2.0 Scoping Overview

Scoping questions, comments, and concerns were requested from the public and government agencies during the 2nd scoping period. The following summarizes the scoping process and efforts made to engage the public and government agencies.

2.1 Scoping Terms

The following terms were used during the scoping process to identify specific actions:

- Comment: a distinct statement, question about a topic, or issue relating to the project.
- Comment Category: a topic to which a comment is addressed.
- Comment Document: a written version of comment(s) submitted by a commenter. One comment document may contain multiple comments.
- Commenter: an individual, organization, or agency providing one or more comments.

2.2 Scoping Schedule

The following dates outline the milestones for the scoping process:

May 28, 2013	Public notice published in the Emery County Progress and the Sun Advocate newspapers
May 28, 2013	Scoping notice mailed and emailed to interested parties
May 29, 2013	2nd scoping period opened
May 29, 2013	Public notice published in the Salt Lake Tribune newspaper
May 30, 2013	Public notice published in the Daily Herald and Moab Times newspapers
June 3, 2013	An Intent to Prepare an Environmental Impact Statement for the Green River/Tusher Diversion Dam Rehabilitation Project, Emery/Grand County, UT published in the Federal Register, Vol. 78, No. 106
June 4, 2013	Public notice published a second time in the Emery County Progress and the Sun Advocate newspapers
June 5, 2013	Public notice published a second time in the Daily Herald
June 6, 2013	Public notice published a second time in the Moab Times newspaper
June 12, 2013	Two public telebriefings conducted consisting of a formal presentation (2:00–2:45 pm MDT and 6:00–6:45 pm MDT), each followed by an informal question and answer session
June 21, 2013	Website updated and email sent to interested parties to announce the extension of the 2nd scoping period closing date to July 2, 2013
July 2, 2013	2nd scoping period closed

2.3 Scoping Notice

A scoping notice was prepared and sent to interested parties and regulatory agencies on May 28, 2013. The list of recipients was prepared by NRCS, UDAF, the Utah Association of Conservation Districts (UACD), and the local Green River irrigators. The scoping notice identified the project and its location, the projects' purpose, and the reasons for preparing an EIS. The scoping notice requested public participation, listed the opening and closing dates for the scoping period, and provided information about the two public telebriefings (date, times, and call number) describing the current status of the project. In addition, the scoping notice listed contact information for submitting written comments. A copy of the scoping notice is attached in Appendix A. The scoping notice was also posted on the NRCS project website (http://www.ut.nrcs.usda.gov/programs/EWP/green_river/index.html).

As noted in Section 2.2, public notices were published in the Salt Lake Tribune, Moab Times-Independent, Daily Herald, Sun Advocate, and Emery County Progress newspapers identifying the project and providing information about the public telebriefings. On June 3, 2013, a Notice of Intent to Prepare an Environmental Impact Statement for the Green River/Tusher Diversion Dam Rehabilitation Project, Emery/Grand County, UT was published in the Federal Register, Vol. 78, No. 106. Copies of the newspaper scoping notices are attached in Appendix B, and the Federal Register Notice of Intent is attached in Appendix C.

2.4 Scoping Telebriefings

The primary purpose of the two scoping telebriefings on June 12, 2013 (2:00 pm MDT and 6:00 pm MDT) was to inform interested parties about the preparation of the EIS and update them regarding the status of the overall project. Interested parties were given the opportunity after the formal presentation to ask questions and provide comments on the preparation of the EIS and overall project. In order to gather as broad an audience as possible, two separate telebriefings were held (see Section 2.2). McMillen, LLC gave a presentation regarding the project and NEPA process at the beginning of each telebriefing. Interested parties could have downloaded the presentation from the project website prior to the meeting and the presentation is located in Appendix D.

Five interested parties and three speakers attended the first telebriefing at 2:00 pm MDT, and six interested parties and two speakers attended the second telebriefing 6:00 pm MDT. Participants were invited to submit comments in writing by mail, facsimile, e-mail, or oral comment during the 2nd scoping comment period for the project. Attendance at the meetings was recorded prior the meeting by the operator who connected each participant to the telebriefing and this list can be found in Appendix D.

2.5 Scoping Mailing List

As mentioned above, the scoping mailing list was prepared by NRCS, UDAF, UACD, and local Green River irrigators to inform the government agencies and general public about the 2nd scoping period for the project. A total of 70 mailings were sent to government agencies and 374 mailings were sent to the general public.

SECTION 3
SCOPING COMMENTS

3.0 Scoping Telebriefings

Two scoping telebriefings were conducted on June 12, 2013 from 2:00 to 2:45 pm MDT and again from 6:00 to 6:45 pm MDT. Each telebriefing was followed by an informal question and answer session. There were zero informal questions asked at either telebriefing.

The following project personnel were in attendance for the telebriefings:

Name	Organization	Title	Telebriefing
Bronson Smart	NRCS	State Conservation Engineer	2:00 pm
Dan Axness	McMillen, LLC	Project Manager	2:00 pm and 6:00 pm
Greg Allington	McMillen, LLC	NEPA Manager	2:00 pm and 6:00 pm

3.1 Written Comments

The 2nd scoping period officially opened on May 29, 2013 and ended on July 2, 2013 for a total of 35 days. Written comments could be submitted via mail, facsimile, e-mail, or oral comment.

Commenters submitted 39 written comments during the scoping period and zero oral comments. Formal written comments are presented in Appendix E.

3.2 Comment Categories

The comments were separated into comment categories to group together similar topics. The categories that were created summarizing the 2nd scoping period are listed below. Specific comment details are listed in the Comment Category Matrix in Appendix E.

- Boat Passage
- Construction Impacts
- Dam Rehabilitation
- Dam Decommission
- Electrical Barrier
- Fish Passage
- Floods
- Funding/Economics
- Habitat
- Historic Preservation
- Hydropower Plant
- Irrigation
- NEPA Process
- Permits

APPENDIX A

SCOPING NOTICE

USDA Natural Resources Conservation Service-Utah
Wallace F. Bennett Federal Building
125 S. State Street – Room 4010
Salt Lake City, UT 84138-1100

May 28, 2013

Dear Interested Parties:

The Natural Resources Conservation Service (NRCS), with the Utah Department of Agriculture and Food (UDAF) as the project sponsor, are proposing to address flood damage on the Green River/Tusher Diversion Dam in Green River, Utah. The proposed project is located approximately 6.6 miles north of the city of Green River on North Long Street. **You are invited to comment on the project and attend a public Telebriefing** which will describe the current status of the project**.**

2nd Scoping Period
Open: Wednesday, May 29, 2013 (12:00 a.m. MDT)
Close: Friday, June 28, 2013 (5:00 p.m. MDT)

Telebriefing #1
When: Wednesday, June 12, 2013
Time: Formal Presentation: 2:00 p.m. – 2:45 p.m. (MDT)
Informal Q&A: 2:45 p.m. – 4:00 p.m. (MDT)
Call: **(**800) 346-7359 (entry code 840561)

Telebriefing #2
When: Wednesday, June 12, 2013
Time: Formal Presentation: 6:00 p.m. – 6:45 p.m. (MDT)
Informal Q&A: 8:45 p.m. – 8:00 p.m. (MDT)
Call: **(**800) 346-7359 (entry code 840561)

Please call 15 minutes prior to the start of the Telebriefing and an operator will connect you to the meeting. Additional Telebriefing information will be posted to the project website prior to June 12, 2013. More project specific information is available by contacting Greg Allington (McMillen, LLC) with the project team by phone at (208) 342-4214 or email at greenriver@mcmillen-llc.com.

……..

Environmental Impact Statement

The NRCS conducted the 1st public scoping period for the project from October 30, 2012 to November 30, 2012 and a public meeting was held on November 15, 2012 at Green River City Hall in Green River, Utah. After the scoping period closed, NRCS consulted with the Utah State Historic Preservation Office under Section 106 of the National Historic Preservation Act regarding the project. It was determined that the diversion dam may be eligible for listing on the National Register of Historic Places and any modifications to the dam may be considered an "adverse effect" which may make it ineligible for listing after rehabilitation. Some of the impacts to the diversion dam from conceptual alternatives considered may be considered "significant" to cultural resources. As a result, NRCS has decided to prepare an Environmental Impact Statement (EIS) for the project instead of an Environment Assessment (EA).

Public Participation

The participation of the public is a vital component of the project so that those who are interested in or potentially affected by the proposed project have an opportunity to share their comments, ideas, and concerns regarding actions during the public scoping stage of the NEPA process. In order to provide the public with an opportunity to comment on the preparation of an EIS and a second opportunity to comment on the overall project, NRCS has open a second public scoping period. You are encouraged to attend the Telebriefing and express your comments, ideas, and concerns. You may also submit your comments via letter, email or fax anytime during the public comment period. For comments to be considered and to become part of the public record for the project, **we need to receive them by close-of-business (5:00 p.m. MDT) on Friday, June 28, 2013**.

Please mail your written comments to:

Green River Diversion Rehabilitation Project
c/o McMillen, LLC – Greg Allington
1401 Shoreline Drive
Boise, ID 83702

You may also submit comments by email, phone or fax to McMillen:

Email: greenriver@mcmillen-llc.com
Phone: (208) 342-4214
Fax: (208) 342-4216

After receiving comments by close-of-business (5:00 p.m. MDT) on Friday, June 28, 2013, the NRCS will begin reviewing the comments and continuing to prepare conceptual alternatives for analysis in the EIS.

You may also visit the project website at http://www.ut.nrcs.usda.gov/programs/EWP/index.html to check on the status of the project and download project related documents during the course of the NEPA analysis.

The project team values your feedback and encourages you to attend the Telebriefing on Wednesday, June 12, 2013 at 2:00 p.m. or 6:00 p.m. (MDT)

Sincerely,

Bronson Smart
NRCS State Engineer

cc: Anthony Beals – NRCS
Norm Evenstad – NRCS
Thayne Mickelson – UDAF
Roger Barton – UACD
Dan Axness – McMillen, LLC
Greg Allington – McMillen, LLC

APPENDIX B

NEWSPAPER SCOPING NOTICES

NRCS PUBLIC NOTICE

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Telebriefing #1		Telebriefing #2	
When:	June 12, 2013	**When:**	June 12, 2013
Time:	2:00 PM to 4:00 PM (MDT)	**Time:**	6:00 PM to 8:00 PM (MDT)
Call:	(800) 346-7359 Entry Code 840561	**Call:**	(800) 346-7359 Entry Code 840561

Comments may be submitted during this 2nd scoping period starting May 29, 2013 and **ending on June 28, 2013 5:00 PM (MDT)** to the following:

Mail:	Green River/Tusher Diversion Rehabilitation Project c/o McMillen, LLC - Greg Allington 1401 Shoreline Drive Boise, Idaho 83702
Email:	greenriver@mcmillen-llc.com
Fax:	(208) 342-4216
Phone:	(208) 342-4214
Website:	http://www.ut.nrcs.usda.gov/programs/EWP/index.html

trapped in the mountains by snow.

When the film does stick to the handcarters, events are filtered mostly through the eyes of Thomas Dobson, a young English pioneer nursing a healthy portion of regret for having left his old life behind.

"Ephraim's Rescue" has some of the same problems that "17 Miracles" did. There's an over-reliance on sonorous music and slow-motion photography to punch up the drama of certain scenes. It's almost comical in some spots, like when a mob of angry hooligans appears at the scene of a Mormon baptism in England. There's surely no shortage of hooligans in England — ask any soccer fan — but there's nothing to ground us even a little bit in the persecution of Mormon converts abroad.

Baptism, rejoicing — blam. Cue slo-mo hooligans.

The film's sense of humor is also hit-and-miss. An attempt to weave in a running polygamy joke mostly falls flat, while a more organic chuckle neatly arises from Thomas comparing notes with pretty Esther about the romantic at-

shoehorned into this or that predicament for the sake of faith-promoting drama. When the handcart company crosses a river in high summer, a pioneer mother, apparently without consulting anyone else in the group, decides that her only means of getting to the opposite bank is to wade the deep water with her young son on her shoulders.

Whether or not it really happened that way (we're told that it did) is beside the point — the filmmaker's job is to suggest why it would have, or might have, happened that way.

Instead, the film has her simply struggle across in full view of any number of people who could have — and, more importantly, would have — rushed to her assistance.

One thing that's conveyed powerfully from start to finish is Ephraim Hanks' uncanny ability to give miraculous healing blessings employing Mormon priesthood rites. Hanks apparently manifested this remarkable gift early in life and Christensen gradually show him put it to use, carefully and respectfully building to scenes that show nearly the entire ritual. Especially tender

Location: Opens Friday at theater in Utah

is Hanks' humble insistence on washing his hands before every blessing.

As the film's frontier savior, Darin Southam is both suitably meek and appropriately rugged, if occasionally somewhat inscrutable. Christensen might have served his star better by giving Hanks a little more human frailty. When Hanks says at one point that his personal failings are too numerous to be counted, Southam makes it sound sincere. Aside from a humorous flash of temper at the expense of two ministers, on the other hand, we haven't seen much to sugges that "Eph" was anything but courteous, kind, obedient, cheerful, thrifty, brave, clea reverent and so forth. A Boy Scout before his time.

Even viewers familiar with the handcart tragedy may no know about Hanks' role in re sponding to it. Despite its ow shortcomings, "Ephraim's Re cue" is a worthwhile tribute t a forgotten hero.

three nights in the valley

Thursday

Stop holding it and just go with the flow: Two tickets to see **"Urinetown"** at Hale Center Theater Orem will help you make a splash as you kick off the weekend.

Pete Widtfeldt

Friday

Who's afraid of Tyrannosaurus rex? Don't make any sudden moves when you sit down to watch **"Jurassic Park"** at Movies 8 in Provo.

Saturday

Ride 'em cowboy! Saddle up the family minivan and head to Springville's rodeo arena (767 W. 1600 South) for the 5th annual **Art City Days Hometown Rodeo**. Admission is just $10 per car, or $5 per person.

Perfect date:
En-gendered to the arts

Jann Haworth

If you want to astound your date this weekend by displaying your vast knowledge of women's issues, or even if you're just up for a good (and free) time, Brigham Young University's Museum of Art is the place to go.

A new contemporary exhibition is set to explore the unique gender politics of Utah from the perspective of four of the state's top artists.

"We're not trying to be critical or negative about the roles of women," curator Jeff Lambson said. "We're just trying to ask some of those tough questions and appreciate all aspects of women's work, whether it's domestic, in the work place or in a social sphere."

"Work to Do" is on display at the museum now until Sept. 28 during regular museum hours. For more information on visiting, go to moa.byu.edu.

— Kari Kenner

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The Ticket is published Thursdays in the Daily Herald.

To submit an item for consideration by **The Ticket** editors, send a letter, postcard or email that gives a complete description of the event including the name of the sponsoring organization, time, date, place, cost and nature of the activity; and a full name and telephone number of a person to call for more information. Send items to **The Ticket Listings**, Daily Herald, 1555 N. Freedom Blvd., Provo, 84603, or email complete info to **theticket@heraldextra.com**. Items must be received no later than noon on the Friday preceding the publication date. No listings will be accepted by phone.

Wrinkle

Continued from D1

"Our approach to the production itself is quite unique," Sorensen said. "There's a quote I use in my program note taken from Friedrich Nietzsche which says, 'Man's maturity: To have regained the seriousness that he had as a child at play.' We, as a production, are working to create a space where we are imaginatively creating this journey that these children go on, and (are) inviting the audience to go on it with us — asking them to suspend their own disbelief and journey with us."

According to Sorensen, the fact that the show is performed as if by young neighborhood friends and children is just one aspect of the creativity involved. All props, set and costumes were created from found objects and require a touch of imagination to bring to life.

Collaboration and creativity form the foundation of the show's direction and production.

"We are approaching it from the completely collaborative idea that anyone who is participating can make comments on any parts of the show, and that their ideas will be listened to and respected," he said. "We make decisions to use those ideas or not collaboratively. ... The company pretty much decides what we want to work on when and how. It's an exploration. This show has creativity and invites people to bring their own creativity to the show."

Sorensen said that despite the unique take on the production, one thing audience members can count on is that the show is true to the original story.

"We have kept the storyline intact and it feels to me that we have stayed very true to her work," he said. "It has values, values that resonate with LDS culture and Christian culture. Values we commend within the mission of this institution. The characters are wonderful, it's fun and it's a work that has shaped people's thoughts and lives for a long time. ... For more than 40 years it has shaped people's thoughts and been a part of how they think about life, and it's still very relevant to today."

The story of "A Wrinkle in Time" centers around the Murry family, especially young Meg and Charles, as well as their friend, Calvin O'Keefe. In an attempt to save their father, who has gotten lost while experimenting with time travel, the trio must journey through the universe and harness the power of love to defeat the forces of evil that try to overcome them.

"Calvin O'Keefe is an older boy from school that becomes friends with Charles and his sister Meg then gets toted along for the ride across the galaxy and universe," said Logan Hayden, who portrays Calvin in the show. "He doesn't know what's going on at first and he and Meg are both kind of shocked by what they see, but he's there to support Meg and becomes a part of the family eventually."

With such a creative foundation, Hayden said above all he hopes audiences can take something good away from the production.

"I don't know if people would come expecting something they've already seen before, but it's going to be unlike anything they've seen," he said. "It's a new experience and I hope any audience member can come look at it with a creative eye or just appreciate it for what it is. ... Imagination and creativity is not something we should shy away from but something we should embrace and seek out. Things aren't always as we think they are, and if an audience member were to feel a renewed desire for imagination and creativity in their lives, that would make me really happy."

SUMMER CONCERT LIST

(Club shows not included)

DEER VALLEY AMPHITHEATER
July 4 — Los Lonely Boys, Alejandro Escovedo
July 15 — Bruce Hornsby & the Noisemakers
July 19 — Steve Martin and The Steep Canyon Rangers featuring Edie Brickell with the Utah Symphony
July 20 — Indigo Girls with the Utah Symphony
July 30 — Natalie Maines
Aug. 3 — Mandy Patinkin with the Utah Symphony
Aug. 4 — Darlene Love and Muscle Shoals Live
Aug. 10 — The Music of The Rolling Stones with the Utah Symphony
Aug. 17 — Lyle Lovett and His Large Band
Aug. 24 — Jewel
Aug. 31 — One Republic, Churchill

THE DEPOT
June 8 — They Might Be Giants
July 7 — Moe
July 10 — Robert Randolph and the Family Band
July 13 — Ratt, Lita Ford
July 18 — Jimmy Eat World
Aug. 1 — The Cult
Aug. 24 — Three Days Grace
Aug. 31 — Pinback
Sept. 20 — Hanson

ENERGYSOLUTIONS ARENA
Saturday — Taylor Swift
Sept. 19 — Muse
Oct. 11 — Josh Groban
Oct. 17 — P!nk
Nov. 14 — Selena Gomez
Nov. 19 — Michael Bublé

THE GREAT SALTAIR
June 21 — Killswitch Engage
July 27 — Slightly Stoopid & Atmposphere
Aug. 23 — fun.

KINGSBURY HALL
Sept. 24 — Diana Krall

LAVELL EDWARDS STADIUM
July 4 — Stadium of Fire (Kelly Clarkson, Carly Rae Jepsen)

THE MAVERIK CENTER
July 25 — One Direction
Aug. 1 — Megadeth, Black Label Society
Aug. 2 — Bruno Mars, and Fitz and the Tantrums
Sept. 3 — Rock Allegiance Tour (Volbeat, HIM, and All That Remains)

RED BUTTE GARDEN
Tonight — Edward Sharpe, The Magnetic Zeroes
June 9 — Trombone Shorty & Orleans Avenue, Big Head Todd and the Monsters
June 16 — Grace Potter and the Nocturnals
June 19 — Jackson Browne
June 20 — Tony Bennett
June 24 — Tedeschi Trucks Band
June 25 — She & Him
July 5 — Old Crow Medicine Show
July 9 — Pink Martini
July 12 — Rodrigo y Gabriela
July 14 — Brandi Carlile
July 15 — David Byrne & St. Vincent
July 17 — Garrison Keillor's A Prairie Home Companion Radio Romance Tour
July 23 — Kenny Loggins
July 25 — Dwight Yoakam
July 30 — Merle Haggard
Aug. 4 — Medeski Martin & Wood, and John Scofield's Uberjam Band
Aug. 7 — Steve Miller Band
Aug. 10 — Steely Dan
Aug. 14 — John Butler Trio
Aug. 18 — Michael Franti & Spearhead
Aug. 20 — John Prine
Aug. 27 — George Thorogood and the Destroyers, Buddy Guy
Aug. 29 — Wayne Shorter 80th Birthday Celebration
Sept. 15 — The Black Crowes
Sept. 16 — Neko Case

RIO TINTO STADIUM
July 27 — Jason Aldean

SANDY AMPHITHEATER
June 7 — Ryan Shupe and the RubberBand
June 8 — King Niko, Hang Time
June 15 — Rhonda Vincent
June 21 — Rockapella
June 26 — American West Symphony and Chorus
July 3 — Pat Benatar and Neil Giraldo
July 6 — Arrival: The Music of Abba
July 9 — Happy Together 2013 (Flo & Eddie, Chuck Negron, Gary Puckett & the Union Gap and more)
July 12 — Exile, Juice Newton
July 13 — New Electric Sound, The North Valley
July 16 — Under the Sun 2013 (Smash Mouth, Sugar Ray, Gin Blossoms, Vertical Horizon, and Fastball)
July 20 — Stayin' Alive
July 23 — Huey Lewis and The News
Aug. 21 — Sail Rock (Christopher Cross, Orleans, Gary Wright, Firefall, John Ford Coley and more)
Aug. 24 — Golden Sun, Polytype
Aug. 29 — Chris Isaak
Sept. 6 — Rockin' the Decades With the Salamanders
Sept. 7 — The Souvenirs, and The Hollering Pines
Sept. 9 — Charley Jenkins
Sept. 13 — Creedence Clearwater Revisited

SCERA SHELL
June 18 — Utah's Stars and Friends (Reunion, Shaun King, Jenny Oaks Baker, Dallyn Vail Bayles, Kendra Lowe, Joshua Creek and more)
June 25 — Josh Turner
July 22 — The 5th Dimension featuring Florence LaRue
Aug. 19 — The Righteous Brothers' Bill Medley
Aug. 29 — Richard Marx
Sept. 2 — Hotel California: A Salute to the Eagles

SPRING ACRES ARTS PARK
June 7 — Lou Gramm Band

STEEL DAYS IN AMERICAN FORK
July 20 — Little River Band

USANA AMPHITHEATRE
Tuesday — Alice Cooper, Marilyn Manson
June 14 — Tim McGraw
June 20 — Barenaked Ladies
July 5 — Free the People 2013
July 18 — Kenny Chesney
July 30 — 311
July 31 — Rush
Aug. 1 — Americanarama Festival of Music (Bob Dylan, Wilco, My Morning Jacket, and Ryan Bingham)
Aug. 2 — Brad Paisley
Aug. 10 — Alan Jackson
Aug. 27 — Dave Matthews Band
Sept. 2 — Uproar Festival (Alice in Chains, Jane's Addiction, Coheed and Cambria, and more)
Sept. 20 — Luke Bryan

UTAH STATE FAIRPARK
June 29 — Vans Warped Tour

Concerts

Continued from D1

check out Steve Martin and The Steep Canyon Rangers (July 19), Mandy Patinkin (Aug. 3) or Selena Gomez (Nov. 14).

Got crooners? Yes we do, with Michael Bublé (Nov. 19), Josh Groban (Oct. 11), Tony Bennett (June 20) and Bruce Hornsby (July 15).

In the legacy category, there is Jackson Browne (June 19), Bob Dylan (Aug. 1) and Steely Dan (Aug. 10).

If you like more bang for your buck, check out these shows with guaranteed fireworks: Stadium of Fire (Kelly Clarkson and Carly Rae Jepsen on July 4), Little River Band (Steel Days on July 20) and Chris Cagle (Saturday as the finale to Pony Express Days).

It's a lively summer for tribute acts as well with Hotel California: A Salute to the Eagles (Sept. 2), Stayin' Alive (The Bee Gees on July 20), Arrival: The Music of Abba (July 6) and Creedence Clearwater Revisited (Sept. 13). OK, we're just joking about that last one, but seriously, without John Fogerty this CCR is pretty close to a tribute.

Be sure to check out our full list of the main summer concerts currently scheduled to find out when and where your favorite bands may be performing.

Ephraim

Continued from D1

whose large spirit belies his small stature.

Yet while the new film devotes substantial screen time to the hardships endured by the handcart companies, the focus is much more on Hanks, who spent his late teenage years in the Navy before following his brother into The Church of Jesus Christ of Latter-day Saints in 1845. After eventually winning the trust of early Mormon leader Brigham Young, Hanks was ready to take immediate action in the fall of 1856 when Mormon leaders in Salt Lake City received word of settlers trapped in the mountains by snow.

When the film does stick to the handcarters, events are filtered mostly through the eyes of Thomas Dobson, a young English pioneer nursing a healthy portion of regret for having left his old life behind.

"Ephraim's Rescue" has some of the same problems that "17 Miracles" did. There's an over-reliance on sonorous music and slow-motion photography to punch up the drama of certain scenes. It's almost comical in some spots, like when a mob of angry hooligans appears at the scene of a Mormon baptism in England. There's surely no shortage of hooligans in England — ask any soccer fan — but there's nothing to ground us even a little bit in the persecution of Mormon converts abroad.

Baptism, rejoicing — blam. Cue slo-mo hooligans.

The film's sense of humor is also hit-and-miss. An attempt to weave in a running polygamy joke mostly falls flat, while a more organic chuckle neatly arises from Thomas comparing notes with pretty Esther about the romantic attachments they've each left behind. Esther, who's been making a steady (and steadily amusing) play for Thomas' affections, is apparently aiming to trade up. "He was quite plain, actually," she says of her former sweetheart. "I just tried not too look at him too much."

Certain scenes come across as forced, with characters shoehorned into this or that predicament for the sake of faith-promoting drama. When the handcart company crosses a river in high summer, a pioneer mother, apparently without consulting anyone else in the group, decides that her only means of getting to the opposite bank is to wade the deep water with her young son on her shoulders.

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Even viewers familiar with the handcart tragedy may not know about Hanks' role in responding to it. Despite its own shortcomings, "Ephraim's Rescue" is a worthwhile tribute to a forgotten hero.

Review C+

EPHRAIM'S RESCUE

Director: T.C. Christensen

Cast: Darin Southam, Katherine Nelson, James Gaisford, Christina Torriente

Running time: 1 hr., 50 min.

Rating: PG for thematic elements and some disturbing images

Location: Opens Friday at theaters in Utah

nology was getting dated and education videos to be donated the skills they need for comm

NRCS PUBLIC NOTICE

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Phone: (208) 342-4214
Website: http://www.ut.nrcs.usda.gov/programs/EWP/index.html

Previous assistance has been provided in China, Morocco, Bolivia, Mexico and Belarus. More information is available at www.shareasmile.net.

Oakeson said the company has a history of helping the community.

drugs. She began using drugs herself. She ended up getting married to a man much like her dad." He said the clinic does care to alleviate pain for someone who does drugs, but does not provide other care until they are clean. When

said. "If we can take them off the street and have them get a job, they can get a social life with some degree of confidence. If they can have some joy in their life and some dignity, it is great. It is about seeing people's lives change."

Train

Continued from A1

Nelson explained to the commission that the railroad needs to build a structure to house the train so they can make Vivian Park a starting point on the line. He also said it would be wise to include a ticket booth, a concession stand and additional parking areas to get things started at the canyon park.

Nelson estimated the railroad would need about $100,000 to get the Vivian Park location up and running. He added that in the future the railroad could make additions at the park, such as a turntable, to increase public interest in the park.

Commissioner Gary Anderson agreed with Nelson that Vivian Park was underutilized by the railroad and said he was interested in moving forward with discussions about how the county can be involved in aiding the railroad. Commissioners Doug Witney and Larry Ellertson also stated they were supportive of seeing if the county can support the railroad in some way but none of the three commissioners were ready to say the county would commit any money to the railroad.

"I think this could be a great little venture," Witney said.

After the meeting with the commissioners Nelson explained that he is trying all avenues to find a way to increase the viability of the railroad. He said he has courted the Legislature for money in the past two legislative sessions but failed in his attempts. He said there was a possibility that the railroad could be altered from being an independent entity of the state to a interlocal agreement between Utah and Wasatch counties and a state department such as UDOT or the state parks.

The Heber Valley Railroad has attempted to evolve from being a scenic train that runs through Provo Canyon to a more family friendly attraction. In the past year the railroad has offered some theme-based rides, like the North Pole Express during the Christmas season and a Harry Potter-based train in the summer.

The railroad has also teamed up with other businesses that operate in Provo Canyon to offer rafting and rail trips as well as a train that includes a zip line excursion.

ons of water used. This omething that happens ry year and will begin 1. A small incremental

ber Carole Larsen. Many suggestions were made as to what should be in the Oran-

gether and moved from place to place.

A Memorial Day program will be held at the cemetery.

NRCS PUBLIC NOTICE

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Call: (800) 346-7359
Entry Code 840561

Telebriefing #2
When: June 12, 2013
Time: 6:00 PM to 8:00 PM (MDT)
Call: (800) 346-7359
Entry Code 840561

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c/o McMillen, LLC - Greg Allington
1401 Shoreline Drive
Boise, Idaho 83702
Email: greenriver@mcmillen-llc.com
Fax: (208) 342-4216
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NRCS

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Fracking...

Continued from page A1

still has not justified the rule from an economic or scientific point of view.

"At a time of limited federal budgets, DOI is canceling lease sales and struggling to issue permits in a timely manner. We continue to question why DOI is taking on a whole new regulatory regime when it lacks resources, expertise, and personnel to implement it."

DOI spokeswoman Jessica Kershaw in Washington, D.C., said the proposed rule should be printed in the Federal Register within days and will then be subject to a 30-day comment period from the public.

The BLM said in a news release the proposal would establish "commonsense safety standards" for hydraulic fracturing.

"Approximately 90 percent of wells drilled on federal and Indian lands use hydraulic fracturing, but the Bureau of Land Management's current regulations governing hydraulic fracturing operations on public lands are more than 30 years old and were not written to address modern hydraulic fracturing activities," according to the news release.

The revised proposed rule will modernize BLM's management of fracking "and help to establish baseline environmental safeguards for these operations across all public and Indian lands," the news release stated.

Steve Bloch, energy program director and attorney with the Southern Utah Wilderness Alliance's Salt Lake City office, said most oil and gas wells in Utah are fracked.

"It is not less controversial here than in other places," he said. "I know folks in Moab are concerned about it. Any time the BLM sells an oil or gas lease it comes with the potential for fracking."

The BLM proposed a draft rule covering fracking in 2012. The current updated draft proposal results from more than 177,000 public comments on that plan.

The latest proposal "revises the array of tools operators may use to show that water is being protected, and provides more guidance on trade secret disclosure, while providing additional flexibility for meeting these objectives," according to the BLM news release.

The BLM noted it is not proposing a change to the provision that allows hydraulic fracturing flowback fluids to be stored either in tanks or in lined pits. But the agency said it is seeking comments on the costs and benefits of requiring those fluids to only be stored in closed tanks.

Deadline looms for municipal elections

By Lisa J. Church
Staff Writer

Candidates for office in Moab and Castle Valley, or for a seat on the Spanish Valley Water and Sewer Improvement District (SVWSID), must file the required paperwork during the first week of June.

In Moab, city council seats now held by Kyle Bailey and Jeff Davis, and the position of mayor will be up for election Nov. 5.

Declarations of candidacy must be filed between June 3 and June 7 at the Moab City Recorder's Office, 217 E. Center St., 435-259-2683.

Under Utah law, candidates for city elections must be current residents who have lived within the city for at least one year.

Castle Valley residents will also choose a mayor, one two-year council position and two four-year council representatives. Candidacy forms are available at the Castle Valley Town Clerk's office, 435-259-9828.

Two seats are also up for election on the Castle Valley Fire District. Candidates must file declarations of candidacy with Bob Lippman, fire commission clerk, between June 3 and June 7 at 5 p.m. Contact Lippman at 259-1182.

Three SVWSID trustee positions will be up for election. Candidacy documents must be filed June 3-7 with the SVWSID Clerk at the Grand Water & Sewer Service Agency office, 3025 E. Spanish Trail Road.

Climbing...

Continued from page A1

Miller said the climbing closures will become an annual event, although the list of routes to be closed probably will change each year as park officials learn more about nesting and lambing habits.

The current closures have a termination date, although Miller noted the temporary bans could be lifted earlier or later depending on the results of area wildlife surveys. Changes in the re-opening dates will be posted on the NPS website at www.nps.gov/arch and announced through the local news media, he said.

The routes now closed but slated to re-open Aug. 15 are Harkened Castle, including the entire rock feature known as Ham Rock; and Tonka Tower, including the entire feature known as Tonka Tower and the feature to the north of Tonka Tower.

Scheduled for re-opening on Aug. 31 are The Pickle, Canyonlands by Night, El Second, The Coup, Cohn's Odyssey, Left Route, Project One and Project Two, Klondike Bluffs Crack Route One and Route Two, Cuddle Bunny Tower, False Start, North Marcher, Sand Hearse, Unknown Matching Men, Fun Ramp, The Hyena, Trail of the Navajo, Pop Tarts and Escape Route.

The Industrial Disease route will re-open Sept. 30.

Local guiding companies are not affected because no commercial operators have worked in Arches since the 1990s, said Heidi Wiley, NPS concessions management specialist.

Canyonlands permit changes

At Canyonlands National Park, visitors requesting backcountry permits will have a shorter period in which to apply.

The change, which goes into effect Sept. 1, affects four-wheel-drive and mountain bike camping, four-wheel-drive day use in the Needles District, group camping in the Needles, river trips, and trips involving combined backpacking and pack rafting, according to a news release from the NPS.

Currently, visitors may book reservations beginning on the second Monday in July for the following year, said Keri Nelson, reservations supervisor for Canyonlands. After the change, reservations will be taken no more than four months, and no less than two days, prior to the permit start date.

Permits and/or sites not reserved at least two days before the permit start date will be available to visitors in person at the park's visitor centers and park headquarters reservation office on a first-come, first-served basis, according to the news release.

Nelson said the change is being made because Canyonlands is updating its reservation process to an online system as opposed to the current mail or fax application process. She added that with the longer time frame to make reservations, many people ended up canceling their reservations, particularly on the popular White Rim.

More information and availability calendars will be posted on Canyonlands' website at www.nps.gov/cany.

Groups seek to block oil shale, tar sands development

By Steve Kadel
Staff Writer

Moab-based Living Rivers has joined other environmental groups in filing a notice of intent to sue the U.S. Bureau of Land Management (BLM) for allegedly failing to protect endangered species on public lands offered for oil shale and tar sands development.

The 60-day notice was filed May 23 in federal court in Denver, said John Weisheit of Living Rivers. The notice is the first step toward filing a lawsuit.

The BLM has allocated more than 800,000 acres of public land in the Colorado River Basin for oil shale and tar sands development, according to a news release from Grand Canyon Trust, one of the groups that filed the notice of intent.

"This plan threatens to industrialize backcountry, pollute air and water, destroy habitat, and commit the Colorado River Basin to an even drier future," Grand Canyon Trust's Taylor McKinnon said in the release.

However, U.S. Rep. Rob Bishop, R-Utah, said in a letter to the U.S. Department of Interior (DOI) that litigation from environmental groups already has reduced the available BLM land for oil shale development in Utah, Colorado and Wyoming from 1.9 million acres to 679,000 acres.

Bishop said the BLM is also proposing "significant changes" to the oil shale commercial leasing program. Those changes include a policy of granting commercial leases for oil shale research and development only after the agency has determined the drilling operations can occur without "unacceptable environmental risk," according to the BLM.

Bishop's letter called that "a nebulous term." He said it duplicates safeguards already in place under the National Environmental Policy Act.

The letter, also signed other senators and representatives, including Sen. Orrin Hatch, R-Utah, asked the DOI to extend the public comment period on the new regulations by 60 days from its May 28 closure. Bishop's spokeswoman Melissa Subbotin said the request was granted.

The BLM's proposed new policy also would replace the current royalty rates industry must pay, a change Bishop and others believe will deter energy development. The new rule would boost the present 5 percent rate adopted in 2008 under the Bush administration to 12.5 percent.

But Steve Bloch, attorney for the Southern Utah Wilderness Alliance, said the oil shale industry now pays les for development rights than does the traditional oil and gas industry.

"It's almost like a taxpayer-funded incentive," Bloch said.

County declines to sign up for American Lands Council membership

By Steve Kadel
Staff Writer

The Grand County Council has rejected a request to become a member of American Lands Council, a group that lobbies for states to take control of federal lands.

Kane County Commissioner Doug Heaton made a pitch for membership during the Grand County Council's meeting on May 7. There was little discussion then, but the issue arose again during the council's Tuesday, May 21, meeting with an agenda item to approve memberships and subscriptions for 2013.

Membership in the American Lands Council would have cost $5,000. However, that wasn't the main reason council members vetoed the idea.

Council vice chairman Lynn Jackson said there are "fundamental problems" with the organization.

"They are a secret Super PAC," he said. "They are not required to report who gives them money or how much money they have."

Jackson said such political action committees "allow our democracy to be purchased."

Officially known as "independent-expenditure only committees," Super PACs are not allowed to give money directly to political candidates' campaigns or political parties. But unlike traditional PACs, there is no legal limit on the size of donations they can accept from individuals, unions, corporations or other groups.

Jackson said many residents of Grand County probably agree with the American Land Council's philosophies while just as many probably are opposed. He said it is wrong to use taxpayer money to support a particular political agenda.

Council chairman Gene Ciarus said he is a member of American Lands Council. Still, he said, "You can question using public money" for membership.

Council member Elizabeth Tubbs also went on record against joining the group, saying she doesn't agree with its primary goal of returning federal lands to states. Tubbs added that $5,000 is too much money to spend for a membership.

Council member Jim Nyland cited the group's private nature in opposing membership.

"I hate to see taxpayer dollars go to a private organization and I'm not sold on this organization," he said.

The American Lands Council's mission is to "secure and defend local control of land access, land use and land ownership," according to an information brochure from the group.

"Federal control of public lands is destroying forests and watersheds, shutting off access, constricting economic opportunity, breaking state and local government budgets, and threatening our way of life," the brochure states.

Fatal Fall...

Continued from page A1

of nature. Your show of love and understanding is met with gratitude."

Patterson's death is the fifth fatality to occur in the backcountry near Moab this year. On March 13, Zachary Taylor, 20, of Moab, died after falling approximately 120 feet while rappelling with friends at Teardrop Arch in the Pritchett Canyon area southwest of town. On March 24, Kyle Lee Stocking, 22, of West Jordan, died while attempting to rope-swing at Corona Arch, northwest of Moab. On May 5, Adam Jason Weber, 32, of Salt Lake City, died from injuries sustained in a 150-foot fall while rope-swinging and rappelling in Day Canyon, about seven miles west of U.S. 191 and the Gemini Bridges parking area. On May 7, Christina Elizabeth Allen, 19, from San Luis Obispo, Calif., died after falling approximately 20 feet while hiking with her family near Kane Creek in San Juan County.

A memorial service for Elizabeth Patterson will be held Sunday, June 9, at 10 a.m. at the top of the gondola in Telluride.

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Mail:	Green River/Tusher Diversion Rehabilitation Project c/o McMillen, LLC - Greg Allington 1401 Shoreline Drive Boise, Idaho 83702
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Fax:	(208) 342-4216
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Boats leaving Lake Powell must be de

Searchers are still finding quagga mussels at Lake Powell. As summer gets closer, you need to be aware of a three-step process you must put your boat through if it's been on the lake.

So far this spring, searchers have found more than 115 quagga mussels attached to boats and boat docks at the Wahweap and Antelope Point marinas at the lake in southern Utah. Larry Dalton, aquatic invasive species coordinator for the Utah Division of Wildlife Resources, says searchers will likely find more mussels as they continue looking.

"No matter where you boat in Utah," Dalton says, "it's absolutely vital that you clean, drain and dry your boat and any equipment that comes in contact with the water."

Once mussels establish themselves in a body of water, Dalton says it's extremely difficult, expensive and sometimes impossible to remove them.

To reduce the chance that boaters accidently transport mussels from Lake Powell to other bodies of water in Utah, effective immedia you must do the followi

Before you leave L Powell, you must beg three-step decontamina process. Before you leav lake, you must clean all n plants, mussels and o debris off of your boat. must also drain all of the water from the boat's bi live and bait wells, bal tanks and lower engine u

After you've comple the first two steps (clean and draining your boat), y can legally leave the lake travel into or through U where you must complet third step: Drying your b at home or having the b serviced at a professio decontamination station.

If you've been boati

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Pet Of

Liberty is a Heeler mix. She female! Found off of 1831

Fo information call 637-6654 or visit

Spo

Juanita

Castleview Hospital is proud to announce

CASTLE COUNTRY

O'Neil

would like to take this opportunity to thank all our many friends, neighbors, and family for the out pour of love for our dear Patti. Words cannot express our appreciation for the visits, cards, calls, food, flowers and contributions.

A very special thanks to Dr. Karen Radley, the emergency room staff, the paramedics, police and fire department and the tender loving care given to Patti at the Utah Valley Regional Neuro Trauma ICU who took care of her every need as well as her family.

Thank you to Father Don Hope for the beautiful vigil and mass, Steve Lasslo and Mike Schmidt for the music, the Funeral Dinner Committee for the lovely dinner, Bobby, Patrick, Annette, and Bob at Mitchells for their compassion and love.

We are blessed to have so many dear and wonderful friends.

Pat O'Neil
Tiffany and Richard
Tyson and Carrie
Pat Colosimo
Sidnee, Bob and Mandee Kraync
Kelli and Allen Nielsen

NRCS

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APPENDIX C

FEDERAL REGISTER NOTICE OF INTENT

ACTION: Notice of extension of public scoping comment period.

DATES: Comments must be received no later than July 8, 2013.

SUMMARY: The Mt. Baker-Snoqualmie National Forest hereby gives notice that it is extending the public scoping comment period for the Green Mountain Lookout Removal Project. A notice was originally published in the **Federal Register** on May 2, 2013 (Volume 78, No. 85), beginning a 30 day comment period. Please see the Notice of Intent (FR Doc. 2013–10322) for more information related to the project. In response to requests for additional time, the Forest Service will extend the comment period from June 3, 2013, to July 8, 2013.

ADDRESSES: Send written comments to Todd Griffin, Project Leader, Mt. Baker-Snoqualmie National Forest, 2930 Wetmore Avenue, Suite 3A, Everett, Washington 98201. Comments may also be sent via email to *toddgriffin@fs.fed.us,* or via facsimile to (425) 783–0141.

FOR FURTHER INFORMATION CONTACT: Todd Griffin, Project Leader, at the address listed above or by telephone (360) 677–2258.

Dated: May 28, 2013.

Steve Kuennen,

Acting Forest Supervisor.

[FR Doc. 2013–13008 Filed 5–31–13; 8:45 am]

BILLING CODE 3410–11–P

DEPARTMENT OF AGRICULTURE

Grain Inspection, Packers and Stockyards Administration

Advisory Committee Meeting

AGENCY: Grain Inspection, Packers and Stockyards Administration, USDA.

ACTION: Notice of advisory committee meeting.

SUMMARY: Pursuant to the Federal Advisory Committee Act, this constitutes notice of the upcoming meeting of the Grain Inspection, Packers and Stockyards Administration (GIPSA) Grain Inspection Advisory Committee (Advisory Committee). The Advisory Committee meets twice annually to advise the GIPSA Administrator on the programs and services that GIPSA delivers under the U.S. Grain Standards Act. Recommendations by the Advisory Committee help GIPSA better meet the needs of its customers who operate in a dynamic and changing marketplace.

DATES: June 18, 2013, 8:00 a.m. to 4:30 p.m.; and June 19, 2010, 8:00 a.m. to Noon.

ADDRESSES: The Advisory Committee meeting will take place at GIPSA's National Grain Center, 10383 N. Ambassador Drive, Kansas City, Missouri 64153.

Requests to orally address the Advisory Committee during the meeting or written comments may be sent to: Administrator, GIPSA, U.S. Department of Agriculture, 1400 Independence Avenue SW., STOP 3601, Washington, DC 20250–3601. Requests and comments may also be faxed to (202) 690–2173.

FOR FURTHER INFORMATION CONTACT: Terri L. Henry by phone at (202) 205–8281 or by email at *Terri.L.Henry@usda.gov*.

SUPPLEMENTARY INFORMATION: The purpose of the Advisory Committee is to provide advice to the GIPSA Administrator with respect to the implementation of the U.S. Grain Standards Act (7 U.S.C. 71–87k). Information about the Advisory Committee is available on the GIPSA Web site at *http://www.gipsa.usda.gov/fgis/adcommit.html*.

The agenda will include an overview of Federal Grain Inspection Service operations-market overview, international programs, moisture meter implementation, update on biotech proficiency program, Field Management Division updates and initiatives, and an overview of the quality pilot in New Orleans and results to date.

For a copy of the agenda please contact Terri L. Henry by phone at (202) 205–8281 or by email at *Terri.L.Henry@usda.gov*.

Public participation will be limited to written statements unless permission is received from the Committee Chairperson to orally address the Advisory Committee. The meeting will be open to the public.

Persons with disabilities who require alternative means of communication of program information or related accommodations should contact Terri L. Henry at the telephone number listed above.

Larry Mitchell,

Administrator, Grain Inspection, Packers and Stockyards Administration.

[FR Doc. 2013–13063 Filed 5–31–13; 8:45 am]

BILLING CODE 3410–KD–P

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

Intent to Prepare an Environmental Impact Statement for the Green River/Tusher Diversion Dam Rehabilitation Project, Emery/Grand County, UT

AGENCY: Natural Resources Conservation Service, USDA.

ACTION: Notice of Intent (NOI) to Prepare an Environmental Impact Statement.

SUMMARY: Pursuant to section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. 4321–4370d, as implemented by the Council of Environmental Quality regulations (40 CFR parts 1500–1508) and Natural Resources Conservation Service (NRCS) regulations that implement NEPA at 7 CFR part 650, the NRCS Utah State Office announces its intent to prepare an Environmental Impact Statement (EIS) for the Green River/Tusher Diversion Dam Rehabilitation project.

The purpose of this notice is to alert interested parties regarding the intent to prepare the EIS, to provide information on the nature of the proposed action and possible alternatives, and to invite public participation in the EIS process (including providing comments on the scope of the draft EIS, to announce that a public scoping meeting will be conducted, and to identify cooperating agency contacts). The EIS process will evaluate alternatives recommended for detailed study as a result of previous planning-level studies completed by NRCS and any additional (new) alternatives identified during scoping.

DATES: Written comments on the scope of the draft EIS, including the project's purpose and need, the alternatives to be considered, types of issues that should be addressed, associated research that should be considered, and the methodologies to be used in impact evaluations should be sent to NRCS starting on May 29, 2013 and ending on or before June 28, 2013 (5:00 p.m. MDT), to the address listed in the **ADDRESSES** section below. Comments submitted after June 28, 2013 will be considered to the extent practicable by the project team.

Two scoping meetings to present the project and develop the scope of the EIS will be held on Wednesday, June 12, 2013, via Tele-briefings. Participants should call (800) 346–7359 (entry code 840561) at least fifteen minutes prior to the meeting and an operator will connect you to the Tele-briefing. The first Tele-briefing will start at 2:00 p.m. (MDT) with a formal presentation and

last until 2:45 p.m. An informal question and answer period will be held from 2:45 p.m. to 4:00 p.m. The second Tele-briefing will start at 6:00 p.m. (MDT) with a formal presentation and last until 6:45 p.m. An informal question and answer period will be held from 6:45 p.m. to 8:00 p.m. Presentation materials will be available on the project Web site (*http://www.ut.nrcs.usda.gov/programs/EWP/index.html*) for participants to download prior to the meeting.

Any individual who requires special assistance to participate in a scoping meeting, such as hard copy documentation of the meeting or other assistance, should contact Mr. Greg Allington, McMillen, LLC, (208) 342–4214 or *greenriver@mcmillen-llc.com* by Friday, May 24, 2013 to allow sufficient time for documents to be mailed or special arrangements to be made.

Scoping meeting presentation materials will be available on the NRCS Utah Emergency Watershed Protection Web site (*http://www.ut.nrcs.usda.gov/programs/EWP/index.html*) prior to the meeting. Electronic copies of the scoping materials may also be obtained from Mr. Greg Allington, McMillen, LLC, (208) 342–4214 or *greenriver@mcmillen-llc.com*. Representatives of Native American tribal governments and of federal, State, regional and local agencies that may have an interest in any aspect of the project will be invited to be cooperating agencies, as appropriate.

ADDRESSES: Formal scoping comments may be submitted via mail, email, fax, or oral telephone comment to:

- Contact: Mr. Greg Allington, McMillen, LLC,
- Mail: 1401 Shoreline Dr., Boise, Idaho 83702
- Email: *greenriver@mcmillen-llc.com*
- Fax: (208) 342–4216
- Telephone: (208) 342–4214.

Details of the public scoping meeting are given above under DATES. Comments should be submitted by close-of-business (5:00 p.m. MDT) June 28, 2013. Respondents should provide contact information if you wish to be included on the EIS mailing list. Please note that any respondent's entire scoping comment, including their personal contact information, may be made publicly available at any time during the EIS process.

FOR FURTHER INFORMATION CONTACT: Mr. Bronson Smart, State Conservation Engineer, Wallace F. Bennett Federal Building, 125 South State Street, Room 4010, Salt Lake City, Utah 84138–1100, or via email at *bronson.smart@ut.usda.gov*. Information may also be obtained from Mr. Greg Allington, McMillen, LLC, 1401 Shoreline Dr., Boise, Idaho 83702, or via email at *greenriver@mcmillen-llc.com*.

SUPPLEMENTARY INFORMATION:

Background—The NRCS and Utah Department of Agriculture and Food (UDAF) are analyzing alternatives to rehabilitate the Green River/Tusher Diversion Dam due to damage from the late 2010 and early 2011 flood events. The dam was constructed in the early 1900's and has been modified over the years to maintain the structure. During the 2010/2011 flood events, flows in the Green River caused severe damage to the diversion structure compromising its structural integrity. If the dam fails, water delivery to two irrigation canals, a historic irrigation water wheel delivery system, and one hydropower plant would be eliminated.

The rehabilitation of the diversion dam would be funded through the NRCS Emergency Watershed Protection (EWP) program (CFR, Title 7: Agriculture, Part 624—Emergency Watershed Protection) via technical assistance and partial construction funding. A National Environmental Policy Act (NEPA) Programmatic EIS was prepared by NRCS for the overall EWP program in 2004; however, the rehabilitation of this diversion dam does not fit within the analysis parameters of the Programmatic EIS. Therefore, additional NEPA analysis is required for this project.

The project started out under the analysis of an Environmental Assessment (EA) during the first scoping period that was opened from October 30, 2012 to November 30, 2012. A public scoping meeting was held on November 15, 2012 at Green River City Hall in Green River, Utah. Through additional consultation with the Utah State Historic Preservation Office (SHPO) under Section 106 of the National Historic Preservation Act, it was determined that the diversion dam may be eligible for listing on the National Register of Historic Places. Any modifications to the dam may be considered an ''adverse effect'' which may make it ineligible for listing after rehabilitation. A wide range of alternatives is being considered for the project as listed in the Alternatives section below. Some of the impacts to the diversion dam from these alternatives may be considered ''significant'' to cultural resources and as a result, NRCS has decided to prepare an EIS for the project. The EIS will be prepared consistent with Title 390, The National Emergency Watershed Protection Program Manual.

The Upper Colorado Endangered Fish Recovery Program (Recovery Program) is proposing to fund and install a fish barrier in the west irrigation and hydropower plant canal to prevent Endangered Species Act (ESA) listed fish species from entering the canal and/or hydropower plant. As part of the dam repair, upstream and downstream fish passage may also be incorporated into the design. These fish protection and passage components are proposed for inclusion in the Green River diversion rehabilitation project to help reduce mortality of ESA listed fish species populations in the Green River.

Scoping Process—NRCS invites all interested individuals and organizations, public agencies, and Native American Tribes to comment on the scope of the EIS, including the project's purpose and need, alternatives proposed to date, new alternatives that should be considered, specific areas of study that might be needed, and evaluation methods to be used.

Background information including the project purpose and need and alternatives developed to date will be available prior to the scoping meeting on the NRCS Utah EWP Web site (*http://www.ut.nrcs.usda.gov/programs/EWP/index.html*). Electronic and hard copies of supporting documentation are also available from Mr. Greg Allington, McMillen, LLC, (208) 342–4214 or *greg.allington@mcmillen-llc.com*.

Once the scope of the EIS is confirmed upon the close of scoping, NRCS will begin preparation of the draft EIS. A summary of comments received during the scoping period will be compiled in a scoping report which will be available on the NRCS Utah EWP Web site.

Project Study Area and Environmental Setting—The proposed project is located approximately 6.6 miles north of the city of Green River in Emery/Grand Counties, Utah. The project study area includes land that is unincorporated on both sides of the Green River. The primary study area includes the diversion dam where rehabilitation activities would occur. Secondary study areas include areas required for alternatives of the project as described in the Alternatives section below such as the powerhouse raceway, irrigation canal on the east side of the diversion dam, construction staging areas on both sides of the river, and potential impacts to the river and riparian area upstream of the diversion dam.

The environmental setting for the project area is primarily located in a riverine environment surrounded by a relatively narrow riparian plant

community adjacent to the river. Beyond the riparian community are agricultural fields on the east side of the diversion dam and BLM land on the west side of the diversion dam that is primarily comprised of desert shrubs and grasses.

Environmental resources consist of the natural and man-made environment. Preliminary resource concerns associated with the rehabilitation of the diversion dam may include both beneficial and negative impacts to water quality and supply, fish, threatened and endangered species, cultural, recreation, aesthetics, and public health and safety.

Alternatives—NRCS is analyzing the following conceptual alternatives to rehabilitate the diversion dam:

- Repair Existing Diversion Dam: Repair the existing diversion to safely pass flood events.
- Replace Existing Diversion Dam: Demolish the existing diversion dam and install a new dam in the same location.
- Replace Diversion Dam Downstream: Demolish the existing diversion dam and install a new diversion dam downstream.
- Replace Diversion Dam Upstream: Demolish the existing diversion dam and install a new diversion dam upstream.
- Diversion Decommissioning: Completely remove the diversion dam from the river and stabilize the diversion site. The existing water rights at the dam would be supplemented via pumping out of the river or other options to provide water to the water rights holders.
- Fish Passage Upstream/Downstream: Construct a passage system(s) on the dam to allow safe upstream and downstream passage of fish over the diversion dam.
- Electric Fish Barrier: Install an electric fish barrier to prevent fish from swimming into the powerhouse and irrigation canal on the west side of the diversion dam.
- Fish Barrier: Install a fish barrier to prevent fish from swimming into irrigation canal on the east side of the diversion dam.
- Boat Passage Upstream/Downstream: Construct a passage system(s) on the dam to allow safe downstream passage of boats past the diversion dam.

NRCS will consider any viable alternatives brought forward during scoping if it is substantially different from the alternatives described above. NRCS will also study a No-Action alternative which would consist of no Federal money used for the rehabilitation of the diversion dam.

Cooperating Agencies—Federal, state, and local agencies that may be interested in or affected by the project may request or be requested by NRCS to become a cooperating agency in the development of the EIS.

Signed this 24th day of May, 2013, in Salt Lake City, Utah.

David C Brown,

Utah State Conservationist, Natural Resources Conservation Service.

[FR Doc. 2013–13062 Filed 5–31–13; 8:45 am]

BILLING CODE 3410–16–P

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

Non-Rock Alternatives to Shoreline Protection Demonstration Project (LA–16) Iberia, Jefferson, and Lafourche Parishes, LA

AGENCY: Natural Resources Conservation Service, Department of Agriculture.

ACTION: Notice of Finding of No Significant Impact.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act of 1969; the Council on Environmental Quality Guidelines (40 CFR part 1500); and the Natural Resources Conservation Service Guidelines (7 CFR part 650); the Natural Resources Conservation Service, U.S. Department of Agriculture, gives notice that an environmental impact statement is not being prepared for the Non-Rock Alternatives to Shoreline Protection Demonstration Project (LA–16), Iberia, Jefferson, and Lafourche Parishes, Louisiana.

FOR FURTHER INFORMATION CONTACT: W. Britt Paul, Acting State Conservationist, Natural Resources Conservation Service, 3737 Government Street, Alexandria, Louisiana 71302; telephone (318) 473–7751.

SUPPLEMENTARY INFORMATION: An environmental assessment of the federally assisted action indicates that the project will not cause significant local, regional, or national impacts on the environment. As a result of these findings, W. Britt Paul, Acting State Conservationist, has determined that preparation and review of an environmental impact statement is not needed for this project.

The project will install and monitor various shoreline protection systems in areas of the state where physical, logistical and environmental limitations preclude the use of rock structures. The shoreline protection systems will be demonstrated in up to three (3) test sites in coastal Louisiana. Up to five (5) ''non-rock'' shoreline protection systems will be installed in 500 linear foot sections at each site, extending a maximum of 4,200 linear feet (including buffer areas) along the shoreline at each site. The sites selected include the western side of the peninsula separating Vermilion and Weeks Bay in Iberia Parish; the southeast shoreline of Lake Salvador in Jefferson Parish; and the western shoreline of Bayou Perot in Lafourche Parish.

The Notice of Finding of No Significant Impact (FONSI) has been forwarded to the Environmental Protection Agency and to various federal, state, and local agencies and interested parties. A limited number of copies of the FONSI are available to fill single copy requests at the above address. Basic data collected during the environmental assessment are on file and may be reviewed by contacting W. Britt Paul.

No administrative action on implementation of the proposal will be taken until 30 days after the date of this publication in the **Federal Register**.

W. Britt Paul,

Acting State Conservationist.

[FR Doc. 2013–13060 Filed 5–31–13; 8:45 am]

BILLING CODE 3410–16–P

DEPARTMENT OF COMMERCE

Foreign-Trade Zones Board

[B–53–2013]

Notification of Proposed Production Activity, The Gas Company, LLC dba Hawai'i Gas, Subzone 9F (Synthetic Natural Gas), Kapolei, Hawaii

The Gas Company, LLC dba Hawai'i Gas (Hawai'i Gas), operator of Subzone 9F, submitted a notification of proposed production activity to the Foreign-Trade Zones (FTZ) Board for their facility in Kapolei, Hawaii. The notification conforming to the requirements of the regulations of the FTZ Board (15 CFR 400.22) was received on May 22, 2013.

The subzone currently has authority to produce synthetic natural gas, carbon dioxide, hydrogen, hydrocarbon gas mixtures and zinc sulfide using certain foreign-status feedstocks produced within Subzone 9A. The current request would allow Hawai'i Gas to admit the feedstocks listed below from any source in foreign status. Pursuant to 15 CFR 400.14(b), FTZ activity would be limited to the specific foreign-status materials and components and specific finished

APPENDIX D

TELEBRIEFING PRESENTATION

Conference Participant List *Client Instant Access, LLC*

2nd Scoping Telebriefing Presentation Attendance List 2:00 PM
Company: McMillen, LLC
Chairperson: Greg Allington
Date of Conference: 6/12/13
Conference ID: 840561

	Last Name	First Name	Company
1	Beals	Tony	USDA NRCS
2	Czapla	Tom	Fish Wildlife
3	Johnson	Floyd	BLM
4	Schou	Nick	Utah Rivers Council
5	Smith	Ted	Software AG
6	**Axness**	Dan	****Speaker****
7	**Allington**	**Greg**	****Speaker****
8	**Smart**	**Bronson**	****Speaker****

Conference Participant List *Client Instant Access, LLC*

2nd Scoping Telebriefing Presentation Attendance List 6:00 PM
Company: McMillen, LLC
Chairperson: Greg Allington
Date of Conference: 6/12/13
Conference ID: 840561

	Last Name	First Name	Company
1	Beals	Tony	USDA & RCF
2	Carey	Jason	River Restoration
3	Hanson	Makeda	Division of Wildlife Resources
4	Hunt	Chet	Green River Canal Company
5	Ryan	Cathy	The City of Green River
6	Young	Brody	Utah State Parks & Recreation
7	**Axness**	**Dan**	****Speaker****
8	**Allington**	**Greg**	****Speaker****

NRCS Emergency Watershed Protection (EWP)
Green River/Tusher Diversion Dam Rehabilitation

Environmental Impact Statement

2nd Scoping Period
Public Telebriefing
June 12, 2013
2:00 PM & 6:00 PM (MDT)

Project Team

Natural Resources Conservation Service (NRCS)
Lead Funding Agency

Utah Department of Agriculture and Food (UDAF)
Project Sponsor

McMillen, LLC
NEPA Project Manager/Concept Design

NRCS EWP Program

Bronson Smart – NRCS Utah
- State Conservation Engineer
- bronson.smart@ut.usda.gov
- 801-524-4559

NRCS EWP Program

- Utah State: $70 million+ in 2012
- Damage to Watersheds from Natural Disasters
- Rehabilitate Structure from 2010/2011 Flood Damage
- Upgrade Structure to Current Engineering Standards and Technology
- Comply with Federal, State and Local Regulations

NRCS EWP Program

- Green River/Tusher Diversion Dam is eligible for funding from 2010/2011 flood event
- The Diversion Dam is a conservation practice and complies with the EWP regulations
- Completing additional NEPA Analysis in the form of an EIS
  - Project not covered in the 2004 Programmatic EIS

NRCS EWP Program

- National EWP Program Manual (Title 390 Part 510-515)
  - http://directives.sc.egov.usda.gov/RollupViewer.aspx?hid=26433
- EWP Program Final Programmatic EIS (2004)
  - http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/ewp/

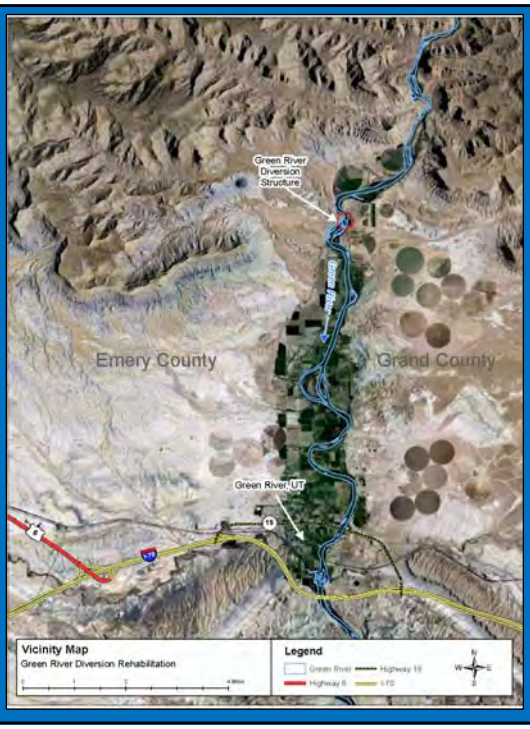
Project Review

McMillen
DESIGN with Vision. BUILD with Integrity.

Dan Axness – McMillen, LLC
- Concept Design Project Manager
- greenriver@mcmillen-llc.com
- 208-342-4214

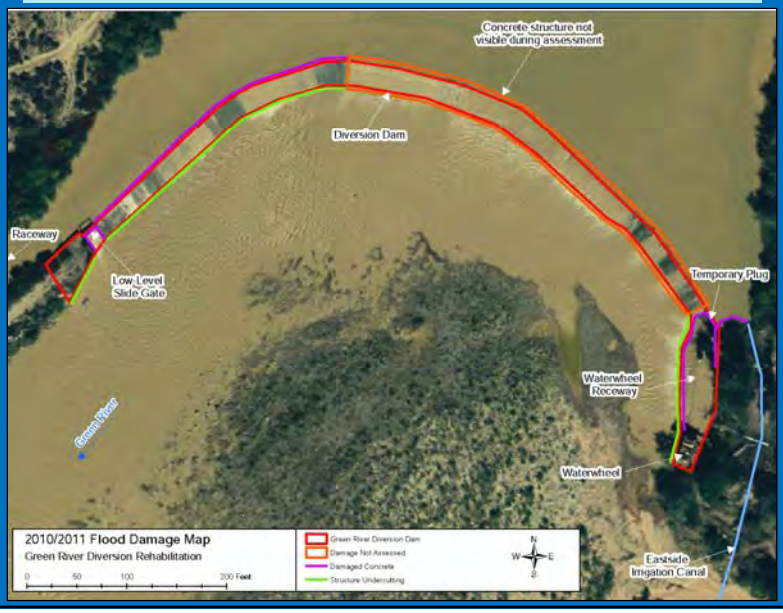
Project Vicinity Map

Dam is ~6 miles north of Green River, Utah



Project Overview Map

2010/2011 Flood Damage Map



Photos

West End of Diversion

East End of Diversion

Photos

East End of Diversion Damage to Waterwheel Raceway (looking u/s)

East End of Diversion Damage to Waterwheel Raceway (looking d/s)

Photos

West End of Diversion Damage to Diversion Dam (looking u/s)

West End of Diversion Damage to Diversion Dam (looking u/s)

13

Photos

Damage to Slide Gate West End of Dam (looking u/s)

Damage to Concrete West End of Diversion

14

Photos

Damage to Concrete West End of Diversion

Damage to Concrete and Entrance to Raceway West End of Diversion

Conceptual Project Alternatives

- No Action
- Rehabilitate Diversion (4 Options)
- Diversion Decommissioning
- Fish Passage Upstream/Downstream
- Fish Passage Monitoring
- Boat Passage Upstream/Downstream
- Fish Barrier(s)

Conceptual Project Alternatives

- Rehabilitate Diversion Options
  - Repair Existing Diversion
  - Replace Existing Diversion
  - Replace Existing Diversion Downstream
  - Replace Existing Diversion Upstream

Fish Passage

- Endangered and Threatened Fish Species under the Endangered Species Act

Razorback Sucker

Colorado Pikeminnow

- Downstream: Notches in Dam
- Upstream: Passage System
- Electronic Tag Reader

Humpback Chub

Bonytail

Fish Barrier(s)

- Electric Barrier: Deter fish from swimming down powerhouse and west irrigation canal raceway
- Barrier: Deter fish from swimming down east irrigation canal

ELECTRIC BARRIER EXAMPLE

Fish and Boat Passage

- Fish and Boat Passage: System to allow safe upstream passage of fish and safe downstream passage of boats past the dam
- Boat Portage: Access around dam during low flow scenarios

FISH AND BOAT PASSAGE SYSTEM EXAMPLE

National Environmental Policy Act

McMILLEN
DESIGN with Vision. BUILD with Integrity.

Greg Allington – McMillen, LLC
– NEPA Project Manager
– greenriver@mcmillen-llc.com
– 208-342-4214

National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190) and the Council on Environmental Qualities regulations at 40 CFR Parts 1500-1508

NRCS NEPA

- Environmental analysis required for major federal actions
- The NRCS is the funding agency for the rehabilitation of the diversion dam (75%)
- The project sponsor provides the remaining 25% cost-share for the diversion dam rehabilitation project

Other Components

- Upper Colorado River Endangered Fish Recovery Program will be implementing the installation of the electric fish barrier project (100%) in the raceway
  - US Bureau of Reclamation is the funding agency
  - US Fish and Wildlife Service is providing technical oversight of the barrier

NEPA Project History

- NEPA process began in September 2012
- Started under the analysis of an Environmental Assessment (EA)
  - 1st Scoping Period
    - Opened: October 30, 2012
    - Public Meeting: November 15, 2012
    - Closed: November 30, 2012
  - 1st Scoping Report is available on the project website

NEPA Project History

- Preliminary Section 106 Consultation with the Utah State Historic Preservation Office after 1st Scoping Period
  - Diversion Dam may be eligible for listing on the National Register of Historic Places
  - Any modification may be considered an "adverse effect" which may make it ineligible for listing depending on the selected alternative
  - NRCS concluded that some of the impacts from alternatives may be considered "significant" to cultural resources

NEPA Project History

- NRCS has decided to prepare an Environmental Impact Statement (EIS) for the project
- Federal Register Notice of Intent (NOI)
  - 2nd Scoping Period
    - Opened: May 29, 2013
    - Public Telebriefings: June 12, 2013
    - **Closes: July 2, 2013 (extended)**

NEPA Public Involvement

- EIS Scoping (30-day)
  - Express initial concerns and suggest alternatives to be considered
- Draft EIS Public Comment Period (45-day)
  - Public review of alternatives and environmental impacts
- Final EIS Public Comment Period (30-day)
  - Proposed alternative published to public with summary of Draft EIS comments
- Record of Decision (ROD) Protest/Appeal (30-day)
  - Project approval by NRCS

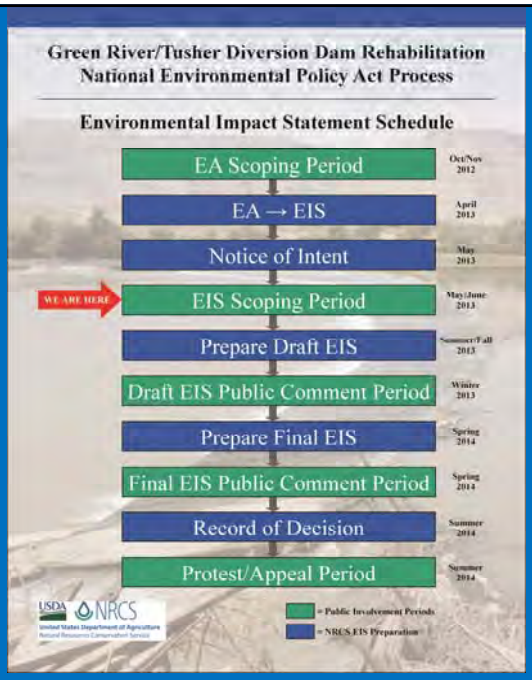
Typical Scoping Concerns

- Project Purpose and Need
- Design Alternatives
  - Including a No-Action Alternative
- Mitigation
- Natural Environment
  - Water Quality and Quantity
  - Fish
  - T&E Species
- Man-made Environment
  - Cultural
  - Recreation
  - Aesthetics
  - Public Health and Safety

Scoping Comments

- Formal comments may be submitted by:
  - Email
  - Written Letter
  - Oral (Phone)

- Scoping Report: Summarizes issues, alternatives and concerns from the public



2nd Public Scoping Comment Closes: July 2, 2013

NEPA Contact Information

- Please contact Greg Allington with McMillen regarding questions and comments:


Phone: 208-342-4214


Fax: 208-342-4216


Email: greenriver@mcmillen-llc.com


Address: 1401 Shoreline Drive
Boise, ID 83702

http://www.ut.nrcs.usda.gov/programs/EWP/index.html

Informal Questions

???

APPENDIX E

COMMENTS

NRCS Green River EIS 2nd Scoping Period – Commenters and Commenter Reference Numbers

Commenter #	Name	Organization	City	State	Comment Document
1	Jack Kloepfer	Public			E-mail
2	Landis Arnold	Public	Longmont	CO	E-mail
3	Helen Howard	Public			E-mail
4	Hal Crimmel	Public	Ogden	UT	E-mail
5	Andrew G. Bentley	Public	Poultney	VT	E-mail
6	Janet Oertli	Public			E-mail
7	Leif M. Johnson	Public	Grand Junction	CO	Mail
8	Herman Hoops	Public	Jensen	UT	Mail
9	Karen Nelson	Public	Castle Valley	UT	E-mail
10	S. Young	Public			E-mail
11	Nick Schou	Utah Rivers Council	Salt Lake City	UT	E-mail
12	John Weisheit	Living Rivers and Colorado Riverkeeper	Moab	UT	E-mail
13	Sam Dorsi	Public	Boulder	CO	E-mail
14	Roy Webb	Public	Salt Lake City	UT	E-mail
15	Eugene Swalberg	Utah State Parks	Green River	UT	Mail
16	Kelly Baustian	Public			E-mail
17	David Jackson	Public	Aurora	CO	E-mail
18	Scott Schreiner	Public	Eagle	CO	E-mail
19	Jordan Witbeck Sherma Witbeck	Public	Vernal	UT	E-mail
20	Thomas Rampton	Public			E-mail
21	Kirk Cooley	Public	Bountiful	UT	E-mail
22	Denny Huffman	Public	Ridgefield	WA	E-mail
23	Dave Kelly	Public	Salt Lake City	UT	E-mail
24	Bill D'Olier	Public	Sandpoint	ID	E-mail
25	Pat Larkin	Public			E-mail
26	Tom Martin	Public	Flagstaff	AZ	E-mail
27	Richard Mingo	USBOR	Salt Lake City	UT	E-mail
28	Ted Smith	Public			E-mail
29	Carole Sue Prescott	Public			E-mail
30	Jennifer Jones	Public			E-mail
31	Karen Hastings Bartlett	Public			E-mail
32	Todd Havener	Public			E-mail
33	Kagan Breitenbach	Public			E-mail
34	Von Bowerman	Public			E-mail
35	Bob Brister	Public	Salt Lake City	UT	E-mail
36	Alice H. Peterson	Public	Santa Cruz	CA	E-mail
37	Kathleen Clarke	Public Lands Policy Coordination Office	Salt Lake City	UT	E-mail
38	Nathan Fey	American Whitewater	Longmont	CO	E-mail
39	Larry Crist	USFWS	West Valley City	UT	Mail

NRCS Green River EIS 2nd Scoping Period – Comment Categories and Commenter Reference Numbers

Comment Category	Comment	Commenter
Boat Passage	Create a flow-through (navigable bypass) for boaters at the diversion dam.	1, 2, 4, 5, 7, 8, 9, 11, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 28, 30, 33, 37, 38
	The lack of a flow-through represents a safety hazard for boaters.	1, 5, 7, 8, 10, 11, 13, 14, 15, 17, 22, 28
	The Green River Diversion structure is the most significant in-channel obstruction on the main segment of the Green River, and starves fish of high quality habitat, while also creating a life threatening recirculating hydraulic that presents significant danger to recreational paddlers at higher flows. Including downstream passage into the rehabilitation plan will eliminate the threat to public safety. We ask that the NRCS and its project partners contact local law enforcement and search and rescue for more information on these non-fatal incidents.	38
	Providing boat passage at the dam will enhance recreational opportunities and bring revenue to the local and/or regional economy.	5, 8, 11, 14, 15, 18, 30
	A white water park would enhance recreational use of the river and would provide economic benefit to the town and/or region.	6, 7, 8, 17
	Providing boat passage would allow boating on the Green River to extend from Flaming Gorge to Lake Powell or to connect other areas of the river.	4, 5, 7, 8, 15, 16, 18, 20, 21, 22, 23, 25, 26
	Portaging around the dam is impractical.	5, 14
	Boat ramps at points upstream and downstream of the dam do not provide a solution to boat passage issues.	13
	If a navigable channel is not provided, consider building boat landings on either side of the dam, connected by a pathway to allow river travelers to manually portage their boats.	13
	Historically, the river was navigable prior to constructing the dam; the dam should not infringe on this navigability.	5, 13, 14, 26
	Provide boat passage in the middle or on the right side of the dam (when facing downstream).	14
	Boating is a non-consumptive use of the Green River and a source of economic generation.	30
	In the past the river trips below the diversion dam to the town of Green River is long and boring because of how slow of speed the river flows. Anybody that did take the trip will not take it again.	34
	If boat passage is included in the project, the boat passage design must be able to maintain the important fish passage components.	39
Construction Impacts	Avoid impacts whenever feasible by following proper construction BMPs, work timing, material selection, and de-watering.	39
Dam Rehabilitation	Make the entire diversion dam a foot higher than the high side is now.	34
	Rebuild/repair dam in the current location.	32

NRCS Green River EIS 2nd Scoping Period – Comment Categories and Commenter Reference Numbers

Comment Category	Comment	Commenter
Dam Decommission	Decommission the Tusher Division Dam in the interest of aiding the aquatic ecology, safety, and local recreation economy.	35
Electrical Barrier	Assist the Upper Colorado River Endangered Fish Recovery Program in the effective design, construction, and operation of an electric barrier to prevent fish entrainment into the Green River canal and Thayn Hydroelectric facility.	39
	Rehabilitation should incorporate a barrier to prevent endangered fish from entering the powerhouse and irrigation canals.	11, 14
Fish Passage	The diversion dam should have a fish ladder.	2, 14
	Modifications should allow upstream and downstream fish passage.	11, 14, 16, 19, 29, 39
Floods	Field research shows that the Green River has experienced large floods of at least 250,000 cubic feet per second. Human-occupied structures and non-human occupied facilities, such as power generation structures, should not be constructed in the floodplain.	12
Funding/Economics	Federal (public) dollars should be used to the make the project safe and beneficial to multiple river user groups.	8
	Provide a cost-benefit analysis to determine whether rehabilitating the existing dam is more cost-effective than replacing it with a pump house.	11, 32
	Provide information about the nature of the insurance coverage carried by the dam's owner and/or operator, and consider possible financial damages accruing from loss of life due to safety issues.	11
Habitat	Maintain suitable fish habitat in the project vicinity, by providing adequate hydrological, thermal, and chemical conditions.	39
Historic Preservation	Listing on the historic register is not a good idea if it means that the dam cannot be torn out, rebuilt, or changed.	1
	The old dam does not warrant historic protection.	3
Hydropower Plant	Do not need to change the plans to the point of falling out of the original protection. Add hydro to tie into the large sluice gates that will be installed in the structure for sluicing sediment on the water wheel side and build a channel down the east side downstream like the west side, so as to copy the west side pump and hydro structure that is in place.	34

NRCS Green River EIS 2nd Scoping Period – Comment Categories and Commenter Reference Numbers

Comment Category	Comment	Commenter
Irrigation	Leave the dam in its present location and continue to use the water wheel.	29, 31, 32
	The dam should be removed in favor of building a pump house on the bank of the river.	11
	On the lower Colorado River, pumps take out water and do not hinder recreation by all types of boaters.	3
	The water wheel is an historic landmark. Protect this resource.	32, 36
	Irrigation is an important consumptive use of the Green River and a source of economic generation in rural Utah.	30
	Use of the water wheel is green technology.	32
NEPA Process	An EA would have been appropriate for this effort.	27
Permits	The State of Utah owns the bed of the Green River in the project area. A permit will be required from the Utah Division of Forestry, Fire, and State Lands for construction activities on the beds of sovereign lands.	37
	Project must comply with the Endangered Species Act of (ESA) of 1973. Any reduced function of a fish passage structure would be considered in an interagency consultation under the ESA.	39

Commenter #1

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of [redacted]
Sent: Tuesday, May 28, 2013 8:22 PM
To: greg.allington@mcmillen-llc.com
Subject: Green River/ Tusher diversion Dam comment

Dear Sir,

Some rules are just plain worn out or they do not apply. In the case of a diversion dam on a heavily silt laden river, the idea of listing it in the registry of historical places is not a good idea, if that means that It can not be torn out, rebuilt, or changed in any way. It simply negates the reason why the thing was built in the first place. With that being said, I believe it will be changed is some way, and when it does, it needs to have a flow through for rafters.

Diversion dams have an expected life span, must be removed or rebuilt. Perhaps when this one was built there was no EPA, or environmental impact statement, and perhaps they did not even have a plan for removal or upgrade. I can not see something like this happening today. We would have a plan for the life span of the diversion, with a definite solution when it reached the end of its life, or a method to upgrade it so it would still be usefull. I also believe that we would not put something as serious as a diversion dam on a major river in moth balls because of some historical value that will have little meaning to anyone who uses the river. It is a chunk of cement and rebar, that must be delt with in some manner that is both safe and efficient for those who use the river in a variety of ways.

My point here is that we use the Green river for recreation as well as for irrigation of crops. I would like to see a diversion with a flow through for rafters. It is an extremely bad Idea not to do this. Many boaters do some of their first trips on Desolation Canyon. When they get down to Swayseys rapid, they think that all the big stuff is behind them. I have seen this attitude hurt people in the past. If they get to a diversion dam with no flow through, then there could be casualties or drownings just because of complacency, or even because of inadequate skill when dealing with something like a diversion dam.

I think something will be done about the condition of this Diversion dam. If it is changed in anyway, there must be a flow through for boaters who want to take out at the state park. To do otherwise is to risk life needlessly. We owe it to future generations to make things a little bit better than they have been in the past.

Finally with the knowledge of the risk to life at diversion dams I think it is a good idea to step forward and make this one an example of what can happen for the good of everyone, the liability risk is also not worth doing nothing or rebuilding it without a flow through.

Thank you for asking for my comment.

Sincerely,
Jack Kloepfer

--
[redacted]

Greg Allington

Commenter #2

From: greenriver@mcmillen-llc.com on behalf of Landis Arnold [redacted]
Sent: Tuesday, May 28, 2013 8:53 PM
To: greg.allington@mcmillen-llc.com
Subject: Boat passages and Fish Ladders should be one and the same - ref Green River Diversion Rehabilitation Project

Hello,
Any sort of Dam or Diversion in a navigable river needs to have a Navigable Boat Passage and Fish Ladder. They should be one and the same. Around the country disfunctional fish ladders have been built that purport to lead fish upstream but they have proven time and time again to not work. Fish want to follow a real channel that acts like a real river.

A Navigable boat passage is the answer to this. The state of Colorado has countless Boat Passages at diversion points that allow functional and complete navigation and which enhance fish habitat along with recreational habitat.

Please follow this approach on the Green River Diversion Rehabilitation Project. I can see no reason for not having a fully navigable bypass.

thank you for your interest and understanding.

--
Landis Arnold
Interstate Boater

[redacted]

Greg Allington

Commenter #3

From: greenriver@mcmillen-llc.com on behalf of Helen Howard [redacted]
Sent: Wednesday, May 29, 2013 6:27 AM
To: greg.allington@mcmillen-llc.com
Subject: Diversion dam above Green River.

I am writing to object to any thing on the river that hinders access to private boaters. The old dam is in poor shape and does not warrent historic protection. On the lower Colorado where I live there are pumps taking water out ofthe Colorado River every half mile or so in some areas. They do not hinder recreation by all types of boaters. (one of the major sources of income to us at Desert River Kayak). I work in recreation here and the Green River is where I go for vacation. Having another dam on that river for just pulling irrigation off is offensive. Helen Howard

Commenter #4

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Hal Crimmel [redacted]
Sent: Wednesday, May 29, 2013 7:59 AM
To: greg.allington@mcmillen-llc.com
Subject: Diversion Dam / Green River / Comments

Dear Public Comment Group:

As an avid river runner I think it absolutely essential that a boat passage be built at the Tuschar Diversion dam rebuild. I will be doing a Deso trip in three weeks and would certainly appreciate having such a feature be built in.

Nationally, the trend is to make our rivers usable by a wide range of users--not just industry or agriculture, and having this boat passage would be a very positive step in the right direction--making it possible to run from Flaming Gorge dam hundreds of miles without encountering any obstacles (short of the river permits).

I know there are many of us who would like to see this feature be installed.

Thank you for your time.

Sincerely,

Hal Crimmel

--

[redacted]

Commenter #5

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Andrew Bentley [redacted]
Sent: Wednesday, May 29, 2013 8:53 AM
To: greg.allington@mcmillen-llc.com
Subject: Public comment about NRCS Green River EIS 2nd Scoping Period Public Notice

Hello Project Team,
Recently I heard about the dam rehab project and have a background in recreation resource use from the University of Idaho. Also, I have guided numerous multi-day, whitewater and flat water float trips on the Green River above and below the dam. As such, I have various concerns about the project, explained below.

Concern one.
The current proposal offers inadequate passage around the dam for river runners seeking to start or end trips on either side of the dam. Those attempting passage in small watercraft (canoe/kayaks, rafts/dories) may therefore experience unnecessary threat of loss to life, limb, or equipment/ goods.

Concern two.
As is well documented, Major Powell's party, ranchers, miners, and others have traveled this river section on more than one occasion for the purpose of trade and industry. There is precedence that the Green River is historically navigable, prior to the establishment of the Tuscher Dam. Replacement of the dam without a passage for watercraft will infringe on this historic navigability.

Concern three.
Outdoor recreation is a top economic generator for Utah tourism. According to the Utah Governor's "State of Utah Outdoor Recreation Vision," taking a long term perspective is key to decision making regarding recreation resource management. Not including boat passage in the dam rehab project may save capital resources on the front end, though opportunities for recreation will be diminished for the long term.

Concern four.
Unique recreation opportunities will be diminished without a boat passage. The ability to connect and float multiple river sections is a rare recreation experience in the United States. The Green River in Utah represents one such opportunity, with one able to travel for hundreds of miles in habitats relatively desolate from other humans. While some may suggest providing a portage route around the dam is sufficient for passage, this suggestion is likely made by those who have never disassembled and portaged fully loaded raft that weighs 2500 pounds. Additionally, for those with hard hulled dory boats, portaging puts undue hardship on those parties who cannot safely carry an empty 500-750 pound boat around the dam.

Thank you for hearing my concerns.
Drew

Sent from an iPhone

Andrew G. Bentley
[redacted]

Greg Allington

Commenter #6

From: greenriver@mcmillen-llc.com on behalf of Janet Oertli [redacted]
Sent: Wednesday, May 29, 2013 9:08 AM
To: greg.allington@mcmillen-llc.com
Subject: NRCS Green River EIS 2nd Scoping Period Public Notice

Dear Mr. Allington,

As a life long user of the Green River and particularly the area around the city of Green River, Utah. I would like to suggest that the Tusher dam rehabilitation project take into account the recreational use and safety of the river.

The Canadian city of Calgary had a dam much like this, which was a danger and old and they have replaced it with a excellent white water park, which draws people to use an area that was once unusable.

http://www.acr-alberta.com/Portals/0/articles/weir.pdf

If something like this could be done in Green River it would draw boaters from all over and provide economic benefit to the town.

I know I'd stay a bit extra to be able to run some more white water.

Sincerely,
Janet Oertli

Leif Johnson Resource Marketing

Commenter #7

May 30, 2013

Greg Allington, Project Manager/Biologist
McMillen, LLC
1401 Shoreline Drive, Suite 100
Boise, ID 83702

Dear Mr. Allington:

RE: Tushar Diversion Dam Project

I am aware of the Tushar Diversion Dam Project on the Green River between Swasey's Rapid and U.S. Highway 6 in Green River, Utah. As an avid boater (*raft/kayak*) of the area, I urge you to include a design passage for rafts and kayaks through or around this project.

Background: I have been Director of Sales at Grand Canyon National Park, South Rim (*AZ*); General Sales Manager at Mammoth Mountain Ski Area (*CA*); Director of Sales at Lake Powell Resorts & Marinas (*AZ/UT*); General Manager of the Yellowstone IMAX Theatre (*West Yellowstone, MT*); Director of Sales at the Adams Mark Hotel (*Grand Junction, CO*); Executive Director of the Palisade Chamber of Commerce (*CO*); Marketing Consultant for San Juan County, Utah; and currently serve as Membership/Marketing Director of the Grand Junction Area Chamber of Commerce (*CO*). Why am I providing you with my background? I believe I have an extensive background to realize the economic benefits. I have been involved in many opportunities of economic development of tourism-related product. I will assure you, economic studies will back up my viewpoint.

Economic Development: This is an unprecedented opportunity for the town of Green River and Emery County to increase recreational tourism, including multi-day trips through Desolation/Gray Canyons and daily trips through Gray Canyon from Nefertiti Rapid (*put-in*) to Green River State Park. The net result: Increased tourism to Green River; more overnight stays in hotels/motels, more expenditures at restaurants, grocery and convenience stores, gas stations, and visitation to the John Wesley Powell Museum. River outfitting companies and rental companies will benefit. Towns and cities - Denver, Steamboat, Glenwood Springs, Durango, and Golden, Colorado - are discovering economic benefits of recreational river parks as part of their marketing. Whitewater boating and kayaking are a multi-million dollar industry. It will draw more people to the area.

Safety: Many low-head diversions are being rehabilitated due to lawsuits that have shown them to be hazards. A boat passage will prevent people from being seriously injured or killed. It will affect the operation of the Endangered Fish Recovery Project by the U.S. Fish and Wildlife Service, State of Utah and other agencies.

The Experience: This project is the only place on the Green River from Flaming Gorge to Lake Powell where one cannot safely run a boat. Each year a number of river runners recreate what is known as "The Powell Trip," launching far upriver and running this section to Hite or Mineral Bottom. Nothing is more exhilarating than exiting Desolation/Gray Canyons and the Book Cliffs, observing the birds and wildlife along the banks, and learning about the history of fur trappers, outlaws, the Powell Expeditions, and river runners along the Green River.

Summary: I believe tourism and ranching can coexist. I've seen it happen in yet another industry in Palisade, Colorado – agritourism - including peach growers, winery/vineyards, alpaca farms, and lavender growers. For reference, I request this letter be kept on file so future litigants may use it in the discovery process. Thank you.

Sincerely,

Leif M. Johnson
President

cc: Bureau of Land Management, Emery County Board of Commissioners, Town of Green River

Commenter #8

April 13, 2013

[redacted]

[redacted]

Greg Allington, Project Manager/Biologist
McMillen, LLC
1401 Shoreline Drive, Suite 100
Boise, ID 83702

Dear Mr. Allington:

I just became aware of the proposal to rebuild the diversion dam at Tuscher (mp8.5 – 1914 survey) on the Green River between Swasey's Rapid (mp12) and the U.S. highway 6 bridge in Green River and I have several comments.

In the rebuilding of this structure you MUST include design for raft passage (approximately ten feet wide).

Not allowing boat passage through this river obstruction is a step backwards, with the new construction making passage more dangerous than the present structure. There are burgeoning rafting rental businesses and outfitting companies that use this section of river. Failure to include a boat passage will have a negative financial impact on those businesses. In addition novice recreational rafters regularly use this section of river, unless at armed guard is posted they will continue to attempt using this section and someone is going to become seriously injured or killed.

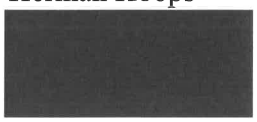
In the U.S. many low head diversions are being rehabilitated because lawsuits have shown them to be hazards (attractive nuisance, like an unfenced swimming pool). Without a boat passage you will be creating a hazard even though people have been notified that it will do so. In addition towns and cities are discovering (Denver, Palisade, Craig , Steamboat, and Grand Junction Colorado for example) the recreational and attractive opportunities of river trails and they are developing that resource as a part of their marketing. Whitewater boating and kayaking are a multi-million dollar industry (indeed if all the commercial companies operating on the Colorado/Green Rivers were one company it would be near the top of the Fortune 500 list). Projections by America Outdoors and the Utah travel people indicate that day trips have not yet come close to their marketing potential. By failing to include a boat passage, and failing to allow for future incorporation of a competition type slalom you are restricting opportunities for green River down the road.

Lots of public (federal) dollars are being spent on this, so it should be made safe and beneficial for multiple river user groups. This proposed project will be the ONLY place on the Green from Flaming Gorge to Lake Powell where one cannot safely run a boat. Each year a number of river runners recreate what is known as "The Powell Trip" and launch far upriver, run through this section and take out at Hite or Mineral Bottom downriver. In addition it will negatively affect the operation of the Endangered fish Recovery project monitoring by the U.S. Fish and Wildlife

service, State of Utah and other agencies.
Finally, I have contacted a number of environmental and river related organizations, who were unaware of this project. I can almost guarantee litigation if a boat passage is not included.

I request this letter be kept on file in order that future litigants may use it in the discovery process.

Herman Hoops



Commenter #9

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Karen Nelson [redacted]
Sent: Thursday, May 30, 2013 8:33 AM
To: greg.allington@mcmillen-llc.com
Subject: Green River Tuscher Dam

Just one short comment. PLEASE include a boat passage channel in the new replacement for this dam. I don't see any reason to exclude boats from passing through this section of river. The use currently coexisted and would like to see that use continue!!!!

Karen Nelson, Castle Valley UT

Greg Allington

Commenter #10

From: greenriver@mcmillen-llc.com on behalf of [redacted]
Sent: Thursday, May 30, 2013 6:17 PM
To: greg.allington@mcmillen-llc.com
Subject: Rusher diversion dam

Curious to the mindset of not having a safe place to run boats, and locals on inner tubes around the diversion? Maybe check out how many deaths happen on low head dams and diversions on the eastern rivers. River management wise it seems the State would be asking and making sure their river bed (sovereign lands), would be safe and free of liability. I bet if it is built in this day and age without a safe option, someone will die, and a law suit will happen. The taxpayers will pay through the nose.

Let's get a safe option, it also helps with searches, and rescues.

S Young

Sent from my iPhone=

Commenter #11

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Nick Schou [nick@utahrivers.org]
Sent: Monday, June 03, 2013 2:11 PM
To: greg.allington@mcmillen-llc.com
Subject: Comments Regarding the Green River Tusher Diversion Dam Rehabilitation
Attachments: Tusher Diversion Comments-URC.pdf

Dear Mr. Allington,

On behalf of Utah Rivers Council, its members, staff, board and volunteers, I respectfully submit the following comments regarding the *Green River Tusher Diversion Dam Rehabilitation* NEPA analysis. Comments are attached. Please don't hesitate to contact me if you have any questions or concerns. Thank you for this opportunity.

Sincerely,

Nick Schou
Water Outreach Manager
Utah Rivers Council
Save Something
1055 East 2100 South, Suite 204
Salt Lake City, Utah 84106
801-486-4776
www.utahrivers.org

Follow Utah Rivers Council on:

Utah Rivers Council
Save Something

June 3, 2013

Attn: Greg Allington
McMillen, LLC
1401 Shoreline Dr.
Boise, ID 83702
greenriver@mcmillen-llc.com
Via Email

Re: Comments Regarding the *Green River Tusher Diversion Dam Rehabilitation*

Dear Mr. Allington,

On behalf of Utah Rivers Council, its members, staff, board and volunteers, I respectfully submit the following comments regarding the *Green River Tusher Diversion Dam Rehabilitation* NEPA analysis.

Utah Rivers Council is a not-for-profit 501(c)(3) grassroots community-based organization that advocates for sound water policy and protection and conservation of Utah's rivers, streams, and clean water sources for today's citizens, future generations and wildlife. The Utah Rivers Council has a long history working to protect Utah's amazing Green River and while this proposal stems from the need to rehabilitate the damaged diversion dam to protect irrigation and hydropower water rights, we assert that there are numerous stakeholders other than irrigators, including river runners, fishermen and conservationists, as well as a native fishes who have a vested interest in seeing the Tusher Dam's removal or modern renovation—rather than simply a rehabilitation of the existing antiquated and deadly obstruction.

The current diversion dam is a dangerous safety hazard to recreation enthusiasts such as river runners, hunters, anglers and bird-watchers. The failed structure constitutes the only river-wide obstacle in the Green River downstream of Flaming Gorge Dam, requiring a mandatory portage by those who value their lives and their personal property. Our organization supports the proposal to remove the dam in favor of building a pump-house on the bank of the river. This would be a win-win solution for all stakeholders, allowing the river to flow free while continuing to meet water delivery obligations to irrigators and the powerhouse. We recognize that this proposal burdens the water users with an additional cost, yet one should not ignore the cost of lost lives which accrue as a function of this hazard. The reality of lost lives in the future is one to which the water users must acknowledge and be prepared to accept. The additional costs associated with future litigation on the part of family of the deceased should also not be overlooked.

Should the dam remain in place our organization strongly supports the proposal to create downstream boat passage past the dam, specifically in the form of an in-stream channel. Upstream boat passage does not seem necessary. In addition to aiding the aquatic ecology and local recreation economy, this option would lessen the owner/operator's future need for expensive insurance coverage as the dam is currently a major public safety liability.

In this regard, we have a number of questions. We have received numerous calls about this deadly hazard posed to the public and many concerned parties have inquired about the ownership of the dam and whether or not the owners/operators have adequate insurance coverage in the likely

event of an accident and subsequent litigation. The first scoping report identifies the project sponsors NRCS and UDAF, but could you please write back to our organization to let us know who owns and operates the dam, as well as the nature of insurance coverage carried by those responsible for the damaged structure? For example, would a single entity like the Green River Canal Company be liable for an accident that occurred because of a single-use structure that obstructs this navigable water way? While dam owners should certainly not have to bare the financial cost of boat passage alone, it only seems reasonable for the owner/operators and other project proponents to seek to prevent any future navigation accidents rather than to prolong the status quo and hope for the best.

Moreover, if the dam is to stay in place its rehabilitation should also include modifications that allow upstream and downstream fish passage over the structure. In particular, this will greatly benefit the four species of endangered native fish in the Green River; Colorado pikeminnow, bonytail chub, humpback chub and razorback sucker as well as other species of native fish and wildlife. Additionally, the rehabilitation should incorporate a much-needed barrier to prevent endangered fish from entering the powerhouse and irrigation canals, reducing accidental takings.

Our organization would also like to see a detailed cost-benefit analysis in order to determine whether rehabilitation of the existing dam is more cost-effective than decommissioning the structure altogether, in favor of a pump house taking water from the main channel of the river. A complete economic analysis should be produced that attempts to weigh the costs of water diverted by the Tusher diversion dam, against the costs of water delivered by a contemporary pumping system.

The eminent threat to human life and the subsequent increase to owner/operator's insurance premiums, alongside possible financial damages accruing from said loss of life must also be considered against the relatively small costs of removing/rehabilitating the dam to avoid fatalities. A thorough analysis will include an estimate of financial damages caused by litigation from mortality alongside an assessment of the likelihood of damages being awarded by the courts. Our organization believes a comprehensive cost-benefit analysis is an indispensable part of determining the most environmentally and economically sound option for rehabilitating the Green River Tusher Diversion Dam. Thank you for the opportunity to provide these comments.

Sincerely,

Nick Schou
Water Outreach Manager

Commenter #12

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of John Weisheit [john@livingrivers.org]
Sent: Monday, June 03, 2013 2:29 PM
To: greg.allington@mcmillen-llc.com
Subject: Tusher Wash Dam: New information for the administrative record
Attachments: SiteFuturesCommLetterFromLRandUWmay2013.pdf; ATT00044.htm

Hi Greg,

Attached please find a letter from Living Rivers dated May 28 written to the "Site Futures Committee," related to the flood history of the Colorado River above Moab, UT. The Site Futures Committee is a group of citizens considering the possible development (or not) of the land now occupied by the Atlas Tailings Pile, which is a waste pile from the milling of uranium ore. This waste is currently being moved off the Colorado River floodplain by the Department of Energy.

Please include this letter as a part of the administrative record for the Environmental Impact Statement regarding the rehabilitation of Tusher Wash Dam.

We mentioned in our scoping letter of November 30, 2012 that we might be able to provide more flood data specific to the Green River. Unfortunately the paleoflood sediment samples are still being processed in Israel. Once they are fully processed and analyzed, we will be able to provide the volume and frequencies of Green River flood events.

In the meantime, let me explain what our field research revealed as it relates to large floods on the Green River above the Confluence with the Colorado River in Canyonlands National Park.

The field work was accomplished in July of 2012. We began our work on the Green River 20 miles above the Confluence with the Colorado River. We dug drenches in many slack water deposits to take measurements and acquire samples for optically stimulated luminescence dating (OSL).

We acquired enough information during our research to reasonably conclude that the Green River has experienced large floods of at least 250,000 cubic feet per second. At one site we noted the evidence of at least 20 individual floods of high volume.

All the best,
John Weisheit
Living Rivers and Colorado Riverkeeper
435-259-1063

To: Site Futures Committee
Norm Boyd, Krissie Braun, Sabrina Henry, Saxon Sharpe, Rock Smith, and Russ von Koch

From: Living Rivers & Uranium Watch
John Weisheit and Sarah Fields

May 28, 2013

Dear sub-committee members:

During the federal National Environmental Policy Act (NEPA) process for the remediation of the Atlas Tailings Pile, a group of citizens obtained a grant from the Citizens' Monitoring and Technical Assessment Fund to include paleoflood data for the administrative record and to demonstrate scientifically that it was in the public's interest to move the tailings pile out of the Colorado River floodplain.

We submitted our final report about the same time that the US Geological Survey (USGS) submitted their findings (circa 2006). The citizens' distributed their report liberally to all interested parties via US Mail and it is posted permanently on the World Wide Web.

2005 USGS Report: http://pubs.usgs.gov/sir/2005/5022/pdf/SIR2005_5022.pdf

2006 Citizens' Report: www.livingrivers.org/pdfs/LRlibrary/MoabMillProject/MoabMillProject.pdf

2007 Citizens' Addendum: www.riversimulator.org/Resources/Hydrology/PaleofloodsColoradoHECRASmagnitudesOctober2006.pdf

The USGS calculated the peak discharge, using the Probable Maximum Precipitation - Probable Maximum Flood (PMP-PMF) model, to be about 300,000 cubic feet per second (cfs). The results of the citizens' paleoflood study shows that at least 2 floods with similar magnitudes did occur during the late history of the Colorado River. Such magnitudes are nearly five times greater than the magnitude of the floods of 1983 and 1984.

To visualize just how large a flood of 300,000 cfs in the Moab Valley would be, Highway 191 would be underwater from where the Grand County Credit Union building is to the junction of the Potash Highway 279. In the city limits of Moab, the river would encroach and parallel 100 West (Swanny City Park). Along our study reach (Highway 128 at Milepost 10.3), such a flood would be more than 15 meters (49 feet) above present winter water levels.

The two studies were different in determining the magnitude and frequency of the largest expected floods. The USGS did two types of analyses: (1) statistical analysis of the measured data and (2) Iteration of the PMP-PMF model. Whereas the citizens' group did a detailed paleoflood study under the supervision of Dr. Victor Baker from the University of Arizona and Dr. Noam Greenbaum from the University of Haifa (Israel).

The USGS's statistical analysis estimated the frequency of the probable maximum flood (PMF) at about 10,000-years. The citizens' paleoflood study revealed that the frequency of floods with magnitude the size of the PMF occurs in much higher frequency. For example, the citizens' report has found geological evidence of at least two floods with a PMF magnitude greater than 300,000 cfs that have occurred in the last 2,100-years, suggesting an average frequency of about 1,000-years to these floods.

We already understand that the Colorado River breaches the river right (north) bank at levels approaching 70,000 cfs. For example, there is a photo of the 1917 flood inundating the land between the Colorado River Bridge and Courthouse Wash Bridge. www.riversimulator.org/Resources/Photos/Moab/1917FloodMoab.jpg

There is a photo from 1957 that shows the Colorado River encroaching upon the site operations of the original uranium mill. www.riversimulator.org/Resources/Photos/Moab/ColoradoRiverFlood1957MoabMill.jpg

We also understand that the flood of 1884 peaked at 125,000 cfs above the mouth of the Dolores River and that this level has been confirmed by other proxies, such as the driftwood lines that still exist along the margins of the Colorado River from this flood. One of these driftwood lines exists at our paleoflood study site above the BLM "take-out" (Milepost 10.3) on the Colorado River "Daily."

Our paleoflood study has not been concluded. Since 2005, we have increased our level of understanding thanks to additional grant money from the Bureau of Reclamation to study paleofloods on the Green River in Canyonlands National Park and to model the flood history of the Upper Colorado River Basin. Dr. Tess Harden (Bureau of Reclamation) provided assistance for this modeling. The model is called FLDFRQ3. The following information will be shortly submitted to publication in a leading journal of hydrology.

The USGS report (Kenney, 2005) has determined the following probabilities for flood magnitudes at Moab, Utah as follows:

1) A 100-year flood – peak discharge of 97,645 cfs.
2) A 500-year flood – peak discharge of 120,070 cfs.
3) The PMF peak discharge – 300,175 cfs.
4) Estimated frequency of the PMF – 10,000-years.

The citizens' report (Greenbaum et al., 2007) determined the following flood frequencies in the last 2,140-years (+/- 220-years):

1) 34 to 40 floods have exceeded the magnitude of the USGS 100-year flood determination.
2) 20 to 25 floods have exceeded the magnitude of the USGS 500-year flood determination.
3) 5 floods have exceeded a peak discharge of 282,000 cfs.
4) The two largest floods exceeds peak discharge of 349,000 cfs.
5) The frequency of these floods is about 1,000-years. This value was also assigned to the USGS PMF.

FLDFRQ3 modeling suggests that flood recurrence intervals would have the following values:

1) The 100-year flood would have a peak discharge ranging from 156,440 to 179,050 cfs.
2) The 500-year flood would have a peak discharge ranging from 224,780 to 265,570 cfs.
3) A 1000-year flood would have a peak discharge ranging from 256,740 to 310,770 cfs.

INTERPRETATION

This data (USGS and Citizens') is more severe than the human instrument record reveals. The instrument record began when the railroad lines entered Grand County in 1883. In 1884 the Loma, Colorado, river gage measured a flood of 125,000 cfs. The second most severe flood happened in 1917, with a peak volume of 76,800 cfs.

According to the USGS statistical data, Grand County hasn't experienced a 100-year flood event since 1884 (129-years ago). According to the FLDFRQ3 modeling, Grand County hasn't experienced a 100-year flood in the chronology of its human history.

The take-home message is: According to our knowledge from the measured data, floods greater than what occurred in 1884 are indeed possible, and the frequency of these floods occur in much shorter intervals. Such floods can severely affect the tailings pile, and, therefore, it is critically important to continue to move the contaminated waste materials from the floodplain as quickly as possible.

The ultimate concerns are: 1) A 100-year flood is overdue, 2) When will the 500-year flood event arrive?, and 3) When will the 1,000-year flood arrive?

We cannot make a prediction regarding these three possible events, but we clearly know that such floods have already occurred in the late history of the Colorado River (twice in the last 2,000-years). Therefore, a prediction is not really vital information for planners. The best planning policy for the moment is to assume that such a flood will arrive someday and the community should be prepared for such an event. The community should adopt a development plan that is compatible with the reality of the Colorado River's flood history.

SUGGESTIONS FOR DEVELOPMENT, OR NOT

1) We suggest strongly that no permanent structures for human occupation be built in the floodplain. Analysis of drill records (DOE Borehole #453) at the mill site indicate significant reworking of driftwood, sediment and gravels during floods. Thus, structures and their foundations would very likely be compromised during major flood events.

2) We also suggest that non-human occupation facilities, such as power generation structures, not be constructed in the floodplain.

3) We strongly suggest that the best use of this land is to respect it for what it truly is—a floodplain buffer. Consider its true value as a free ecological service to lessen the impacts of flooding in the Moab Valley.

Sincerely yours,

John Weisheit
Living Rivers
PO Box 466
Moab, UT 84532
435-259-1063
john@livingrivers.org

Sarah Fields
Uranium Watch
PO Box 344
Moab, UT 84532
435-259-9450
sarah@uraniumwatch.org

Greg Allington

Commenter #13

From: greenriver@mcmillen-llc.com on behalf of Samuel W Dorsi [redacted]
Sent: Tuesday, June 04, 2013 8:04 AM
To: greg.allington@mcmillen-llc.com
Subject: Green River 2nd Scoping Period comments

Mr. Allington --

Please include these comments in the official public record for the 2nd Scoping Period.

I would like to advocate for a safe, navigable route through the current diversion structure that lies on the Green River above the town of Green River, UT. The existing dam divides two sections of river--Desolation Canyon and Labyrinth Canyon, both of which are popular with recreating families--with a structure that is at least inconvenient and at worst dangerous. Water travel is a traditional use of the river and should be facilitated with a basic downstream boat channel.

For non-motorized users, who are limited to downstream travel, the presence of the dam prevents access to the section of river that starts at the dam and runs downstream to the next access point.

Earlier public comments stated that no channel was needed, since boat ramps were available at points upstream and downstream of the dam. However, this is an inadequate solution for many river users. These two closest access points are some distance from the dam itself, and would not provide a realistic alternative for many users, especially those on longer trips who don't have access to their vehicles as they travel this section of river. This would be the case, for example, for a party that wished to travel from Desolation Canyon down to Crystal Geyser or to Mineral Bottom: the vehicles used to access this section of water would not easily be available at Swazey's Beach to bypass the dam.

Please include a navigable channel in any plan for renovations made to the current diversion dam. A less desirable option that would still represent an improvement to the current situation would be to build boat landings on either side of the dam, connected by a pathway to allow for river travelers to manually portage their boats.

Thank you for considering the installment of a boat channel,

Sam Dorsi
[redacted]

Greg Allington

Commenter #14

From: greenriver@mcmillen-llc.com on behalf of Roy Webb [redacted]
Sent: Wednesday, June 05, 2013 11:33 AM
To: greg.allington@mcmillen-llc.com
Subject: Re: NRCS Green River EIS 2nd Scoping Period Public Notice

Mr. Allington,

Thanks for the notice and the opportunity to comment on this project. As an historian who has studied travel on the Green River for many years, I have strong opinions about how this project should proceed. I agree with the stated goals of protecting the irrigation and hydropower stake holders; feel that the endangered fish should be given special consideration both in keeping them out of places where they will be trapped and killed; and with the idea of a fish ladder or passage around the dam in both directions, to ensure that they can spawn and travel up and downriver safely.

My particular concern, however, is in the downstream boat passage. As has been noted by others, this is the longest remaining free-flowing stretch of the Green River, and I would argue that not only is the dam itself, as a structure, historic, the idea of being able to float a stretch of the Green without portages or barriers is likewise worthy of consideration as a cultural resource. From John Wesley Powell in 1869, people in boats have been able to float this stretch of the Green and that historic use should be taken into consideration when planning for this repairs to this dam. This would have to be in the form of a safe downstream passage, preferably in the middle or on the right side of the dam (when facing downstream). The current slot, on the left, leads a boat onto the island just below and has been the scene of more than one mishap. Running the center of the dam at anything but high water is a dangerous undertaking. A downstream boat passage should allow for safe and easy passage at any water level.

A portage path by itself around the dam is really not an option in this day and age. Unless one is on a day trip in a small, light craft, unloading and de-rigging your boat to carry the whole thing around the dam is not feasible. Many people who do long extended journeys on the Green are in small parties or even solo, and moving the boat by yourself is not possible. Also, wouldn't private land have to be set aside for such a passage, requiring negotiations with the land-owners?

I support the repairs to this dam since it has qualified as a historic cultural resource, but I would argue that a downstream boat passage, passable safely in any water level, is equally important. Not only will those who do through-trips use it, it could foster the development of a recreational boating industry in Green River that is not presently possible, because there is no safe passage through the dam. I would encourage the planners to make sure that safe downstream boat passage is included in the final specifications for any changes made to the Tusher Dam.

Roy Webb

[redacted]

From: Greg Allington <Greg.Allington@mcmillen-llc.com>
To: Greg Allington <Greg.Allington@mcmillen-llc.com>
Sent: Tuesday, May 28, 2013 4:55 PM
Subject: NRCS Green River EIS 2nd Scoping Period Public Notice

Good Afternoon Interested Party,

Please find attached the Public Notice for the 2nd Scoping Period for the Green River Diversion Rehabilitation Project.

Official comments should sent to greenriver@mcmillen-llc.com or myself at the physical address listed below.

Additional project information is also listed on the project website at http://www.ut.nrcs.usda.gov/programs/EWP/index.html which will be updated throughout the course of the NEPA analysis and project.

For some of you this may be a duplicate notice. If you would not like to receive duplicate notices in the future, please respond to this email how you would like to be notified (email or mail).

Thank you. You may contact me at any time with any questions or comments about the project.

Greg Allington
Project Manager/Biologist

McMillen, LLC
1401 Shoreline Drive, Suite 100 Boise, ID 83702
p 208.342.4214 x 318 | f 208.342.4216 | c 208.340.5721
greg.allington@mcmillen-llc.com | www.mcmillen-llc.com

GARY R. HERBERT
Governor
GREG BELL
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of State Parks and Recreation
FRED HAYES
Division Director

Commenter #15

May 29, 2013

Green River diversion rehabilitation project
c/o McMillen, LLC – Greg Allington
1401 Shoreline Drive
Boise, ID 83702

Dear Greg:

Green River State Park is located at river mile zero on the Green River approx. 8.5 river miles below the diversion dam. The park has been a historic launching point for downstream travel, but due to the diversion dam and the associated private property rights, the park has not been able to safely function as a take-out for any upstream river activity. The diversion dam is located between two major river recreation access points – Swasey's beach/boat ramp located at river mile 10 and Green River State Park.

On behalf of Utah State Parks we would encourage a serious look at dam design options that would allow for safe downstream recreational vessel travel from Swasey's beach to the Green River State Park. This would create positive economic impacts/benefits for the park and for all tourism related businesses in the city of Green River. Allow access across the dam would offer recreational boaters a wonderful float trip between two easy river access points. Visitors seeking an 'on your own' float trip would be treated to beautiful vistas of the Bookcliffs and an abundance of wildlife viewing opportunities. Local commercial river outfitters could enjoy an increase in potential business and other ancillary business opportunities that may result from the increased visitation to a 'new' recreation opportunity.

Redesigning the dam to allow for safe passage downstream would alleviate the current dangerous conditions faced by boaters who missed Swasey's take out. Currently boaters, after a 'daily trip' or the more extensive river trip through Desolation Canyon, have to deal with the terror of an overhead dam if they miss Swasey's. A redesign allowing access would eliminate this dangerous navigational hazard and improve the public's recreational experience on the Green River. A recent article published in the Salt Lake Tribune on the Century-old Tusher diversion dam quotes an engineer with the Colorado firm River Restoration as saying, "It is not unreasonable to have safe boating and great melons in Green River." We concur with this statement.

Sincerely,

Eugene Swalberg, Manager
Utah State Parks

Green River State Park/Goblin Valley State Park, 130 S Fairway Drive, PO Box 637, Green River, UT 84525-0637
telephone (435) 564-3633 • facsimile (435) 564-3223 •TTY (801) 538-7458 • *www.stateparks.utah.gov*

UTAH DNR STATE PARKS

Greg Allington

Commenter #16

From: greenriver@mcmillen-llc.com on behalf of Kelly Baustian [redacted]
Sent: Thursday, June 06, 2013 8:12 AM
To: greg.allington@mcmillen-llc.com
Subject: Green River/Tusher Dam Refurbishment_Public Comment

Dear Greg,

Thank you for your willingness to collect public comments regarding the rehabilitation of the Green River/Tusher Diversion Dam project.

As a avid boater of Western waterways, I would like to see a small boat channel included as part of the refurbishment so the river can be safely floated at all levels. I see this as unprecedented opportunity to improve navigation and fish migration in the Green river. As the only dam on the Green River below Flaming Gorge, the addition of a boat passage would enable boaters to link several sections of great river.

Thank you,
Kelly Baustian=

Commenter #17

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of David Jackson [redacted]
Sent: Saturday, June 08, 2013 8:40 PM
To: greg.allington@mcmillen-llc.com
Subject: Tusher Dam revision

Thank you for taking comments about the Tusher diversion dam.

I am first and foremost concerned about having safe passage for boats. More and more people are continuing their Desolation Canyon float trips through Green River and on into Canyonlands. Placing an unrunnable obstacle in the middle of that float is dangerous and all but guarantees future expenditures on fixing that mistake. I am locally familiar with, and would refer you to, the modifications to countless low-head dams along the South Platte through Denver that caught and killed unexpecting swimmers to see the future of any dam that does not include boat passage.

Secondly, I think this is a great opportunity to enhance the recreation economy of Green River by including a whitewater play park. Even a single wave with good and consistent surf is a huge draw, and would bring people to Green River specifically to kayak and surf throughout the year. Including a play feature in the initial design would add minimal cost and yet give great benefit to the region's economy for years.

Please feel free to contact me with any questions.

Thank you,
David Jackson
[redacted]

Commenter #18

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of scott schreiner [redacted]
Sent: Sunday, June 09, 2013 9:19 AM
To: greg.allington@mcmillen-llc.com
Subject: Green River/Tusher Diversion Dam

I have recently been informed of the proposed changes/repairs proposed for the Tusher Diversion Damn on the Green River. This would seem like the perfect opportunity to create a safe passage for all downstream traffic in the form of a boat shoot or other navigable bypass structure. As the only obstruction on the Green River from Flaming Gorge to the confluence, this damn creates various headaches and logistical problems for downstream travel. With the addition of safe passage for downstream travel, boaters could extend their trips to Green River State Park and provide a boost to the local businesses in Green River rather than merely passing by on their way home. Furthermore, boaters looking to float Labrynth and Stillwater Canyons could extend there trips to include the rapids of the Green River Daily, or, perhaps, create a longer daily run starting with the Green River Daily and taking out at Crystal Geyser. i am sure that your local rafting companies would love the opportunity to offer linger trips that expose their clinets to the beauty of both Utah and the Green River area.

Sincerely,

Scott Schreiner

[redacted]

Commenter #19

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Sherma Witbeck [redacted]
Sent: Sunday, June 16, 2013 3:05 PM
To: greg.allington@mcmillen-llc.com
Subject: Green River

Too whom it may concern,

Upon review of the proposal: **Green River/Tusher Diversion Dam Rehabilitiation**
We would hope that some thought and provision are made to allow river access through an in stream channel for boats, rafts and any other water craft. This same in stream channel could also be designed not to imped but encourage the movement of animals including fish around the dam.

Jordan Witbeck
Sherma Witbeck
[redacted]

Sent from Windows Mail

Commenter #20

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Thomas Rampton [redacted] enterprises.com]
Sent: Friday, June 21, 2013 11:59 PM
To: greg.allington@mcmillen-llc.com
Subject: Fwd: [Rafting_Grand_Canyon] Tusher Diversion Dam Rehabilitation Comments

I too consider it important that a way for rivercraft be included in any work on Tusher Dam. There is a river trip upstream of Green River (Desolation Canyon) and another downstream (Labyrinth Canyon), not to mention Stillwater and Cataract Canyons. It ought to remain possible to connect these trips.

Thomas Rampton
Author, *Desolation and Gray Canyons River Guide* and *Labyrinth Canyon River Guide*

Commenter #21

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of [redacted]
Sent: Saturday, June 22, 2013 5:30 AM
To: greg.allington@mcmillen-llc.com
Subject: Tusher Diversion Dam Rehabilitation

Dear Mr Allington,

I am one of many whitewater boaters who have run the Tusher Dam during the coarse of it's life. This was done to link my Desolation Gray Canyon river trip with continuing on down through Labyrinth, Stillwater and Cataract Canyons to Hite. Please include a boatable passage in the revision of the Tusher damn so that the next generation of boaters can enjoy the thrill of running the damn and having a nice long river trip experience (almost a Grand Canyon length river trip). Thank you for the opportunity to comment on the revision project.
Sincerely,

Kirk Cooley
[redacted]

Commenter #22

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Denny Huffman [redacted]
Sent: Saturday, June 22, 2013 8:16 AM
To: greg.allington@mcmillen-llc.com
Subject: Safe Boat Passage - Public Comment

Dear Mr. Allington:

As one of thousands of private river users along the Green River stem I write with grave concern about the proposal to rebuild the diversion dam at Tuscher between Swasey's Rapid and the U.S. highway 6 bridge in Green River. It is imperative that this proposal include a safe boat passage for those river users. If the rebuilding of this dam does not include such a passage it would be the only such obstacle to safe river running between the Flaming Gorge Dam and the Lake Powell Dam. The implications of not including a safe boat passage related to the high potential for loss of life and attendant legal ramifications are well known throughout our country.

I write to specifically ask that such a safe boating option be added to this project. Please keep this email as part of the public involvement process.

Denny Huffman
[redacted]

Commenter #23

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of David Kelly [redacted]
Sent: Saturday, June 22, 2013 7:11 PM
To: greg.allington@mcmillen-llc.com
Subject: Green River Diversion Dam

Dear Sir or Madam,

My name is Dave Kelly and I am boater in support of a navigable passage through the Tusher Diversion Dam located north of Green River, Utah and south of Swasey's Rapid. I support having a navigable passage that makes boating from Flaming Gorge to Lake Powell a journey safe from man-made hazards.

Thanks,
Dave Kelly
[redacted]

Commenter #24

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of [redacted]
Sent: Sunday, June 23, 2013 8:29 AM
To: greg.allington@mcmillen-llc.com
Subject: Tusher Diversion Dam

Mr. Greg Allington
McMillen LLC

Dear Mr. Allington;

I'm writing to ask that a boater bypass be included in the rehab of the Tusher Diversion Dam on the Green upstram of Green River. We floaters wouldn't need anything elaborate. We'd probably be easier to accomodate than the fish. Thanks for your consideration.

Bill D'Olier
Sandpoint, Idaho
(a multiple time Green River floater)

Commenter #25

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Steve Larkin [redacted]
Sent: Sunday, June 23, 2013 8:29 AM
To: greg.allington@mcmillen-llc.com
Subject: Tusher Dam

To Whom It May Concern:

It has come to my attention that work is being considered on the Tusher Dam on the Green River, and that due to this work, the dam may become impassable to rafts, dories, etc.

I first ran the Tusher Dam in 1989 on a trip from Sand Wash to Hite. Being able to run such a long stretch of river remains one of my most memorable trips. I would hate to think that I could never repeat this journey.

In considering what needs to be done to the dam I would ask that you please include something that would keep the dam passable by water craft.

Thank you for your consideration,
Pat Larkin

Commenter #26

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Tom Martin [redacted]
Sent: Sunday, June 23, 2013 8:29 AM
To: greg.allington@mcmillen-llc.com
Subject: Tusher Diversion Dam Rehabilitation Comments

Emergency Watershed Protection, Green River/Tusher Diversion Dam Rehabilitation
Mr. Greg Allington
McMillen, LLC
1401 Shoreline Dr.
Boise, ID 83702

June 21, 2013

Dear Mr. Allington,

Thank you for the opportunity to comment during the public scoping period on the Tusher Diversion Dam Rehabilitation.

In the book I wrote, *Big Water Little Boats, Moulty Fulmer and the First Grand Canyon Dory on the Last of the Wild Colorado River*, Vishnu Temple Press, 2012, there is a photo on page 69 of Moulty Fulmer running his first dory named MOJA down the left tongue of the Tusher Diversion Dam. The photo was taken on the 4th of July, 1951. Fulmer is rowing the MOJA, and his passenger is Otis "Dock" Marston's daughter Maradel, sitting in front of him in the footwell of the boat. The flow is 14,600 cfs. The river party floated on downriver to the highway bridge at Green River, UT, and took out there. I found this photo in the Marston Collection at the Huntington Library, and point this out to you as evidence for a very long history of river runners interfacing with and rowing over the Tusher Diversion Dam.

I made my first crossing of the Tusher Diversion Dam rowing a rubber raft in September, 1996, on a river trip from Sand Wash at the start of Desolation Canyon to Hite, Utah, below Cataract Canyon. Running the Tusher Diversion dam, as Moulty Fulmer and Dock Marston had done before me, adds immense value to our river trips. I urge you to include a downstream boat passage in-stream channel on the Tusher Diversion Dam in the FEIS of this project, preserving our American heritage into the next 100 years of river running on the Green River.

If you could kindly acknowledge receipt of this e-mail, I would be most appreciative.

Sincerely yours,

Tom Martin
[redacted]

Commenter #27

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Mingo, Richard [rmingo@usbr.gov]
Sent: Monday, June 24, 2013 8:57 AM
To: greg.allington@mcmillen-llc.com
Subject: green river tusher diversion dam

I just received and reviewed your scoping notice for the subject project. I don't have any comments other than an "adverse effect" under Section 106 is different than "significant impact" under NEPA and an EA would have been appropriate, all else the same.

—

Richard Mingo | Utah Reclamation Mitigation & Conservation Commission
230 South 500 East Suite 230 | Salt Lake City, Utah 84102
p. 801.524.3168 | c. 801.884.6130 | rmingo@usbr.gov

Commenter #28

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Smith, Ted [redacted]
Sent: Monday, June 24, 2013 4:25 PM
To: greg.allington@mcmillen-llc.com
Subject: Green River Diversion Rehabilitation Project c/o McMillen, LLC – Greg Allington

Hello,

Thanks you for the opportunity to comment on the green river diversion dam.
I would like to see a boat ramp built into the diversion dam. Currently this dam requires portage to be safe to get by it. This can be a lengthy and dangerous in it's self.
I have heard stories of the dangers people have encountered running over this dam.

Thank you for your time.

Best regards,
Ted Smith
[redacted]

Commenter #29

Greg Allington

From: [redacted]
Sent: Tuesday, June 25, 2013 10:31 AM
To: greg.allington@mcmillen-llc.com
Subject: Green River Diversion Repair input

Dear Greg,
Please send us any information you have now or have in the future regarding the status of the Green River/Tusher Diversion Dam Rehabilitation Project. We are concerned property owners or family members of the Hasting Ranch in which the water wheel is located:

[redacted]

We are most concerned about the Green River /Tusher Diversion Dam Rehabiltation project as to its impact on our obtaining water from the Green River using the water wheel to irrigate part of the Hastings Ranch property as it has in some form since the early 1900's and since the 1880 Survey. We will be sending you facts about the water wheel and dam recorded by Howard Laurence Hastings to the Grand County Historical Preservation Commission and the Utah State Historical Society, February 16, 2000. We feel the dam should be left in its present location with the rehabilitation or reconstruction that is proposed to repair flood damage of 2010/2011. Please advise us and send us any information you have on this project as it greatly affect our land.

Most sincerely:
Carole Sue Prescott
[redacted]

Commenter #30

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Jennifer Jones [redacted]
Sent: Tuesday, June 25, 2013 5:21 PM
To: greg.allington@mcmillen-llc.com
Subject: public comment

To Whom It May Concern:

Please consider the recreational boating potential of the Green River... If a boater pass through is created it would allow for the potential increase in generation of economic revenue to the community of Green River. A new passage for boats would increase the floating opportunities for paddlers of all types. By not considering this option you will effectively continue to discourage through boater traffic that may otherwise continue downstream. The engineering required for a boater pass through is viable and should be implemented.

Obviously irrigation is an important consumptive use of the Green River and a source of economic generation in rural Utah. Boating is a non-consumptive use of the Green River and a source of economic generation.

Thank you for considering my comments during the analysis.

Commenter #31

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Bartlett, Karen [redacted]
Sent: Wednesday, June 26, 2013 9:13 AM
To: greg.allington@mcmillen-llc.com
Subject: NRCS Green River EIS scoping request

Irrigation water for the property (tax record parcels 05-016-0003 and 05-017-0007) is taken from the Green River at the point the diversion dam meets the east shore of the river. The land (234.23 acres) has been under continuous irrigation for garden, orchard, and hay fields using either water wheel and/or electric pump since 1912.

I support re-construction of the dam to continue to provide water to existing irrigation ditches that service the east side of the river, and for the point of take out for the property described above.

I am a co-owner of this property (10% share tenants in common).

Regards,
Karen Hastings Bartlett

Commenter #32

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Todd Havener [redacted]
Sent: Wednesday, June 26, 2013 9:13 AM
To: greg.allington@mcmillen-llc.com
Subject: Greenriver Diversion Rehabilitation Project

To whom it may concern:
I'm in favor or rebuilding/ repairing the diversion dam in it current location for economic, cultural/historical and environmental reasons.

The infrastructure for both the East/West irrigation canals are in place and do not need to be modified by keeping the diversion dam in its current location. If the dam is rebuilt up or downstream these would also have to be modified costing both more money and further damage to the surrounding environment.

The waterwheel on the Hastings ranch is a historical landmark and part of Greenrivers cultural heritage. Keeping and repairing the diversion dam in its current location maintains the functionality of the waterwheel and preserves our heritage. Moving the dam will destroy the waterwheels inflow and bring to an end this important part of our history. The waterwheel has been functioning in various forms for decades, has lasted through many floods and has proven its ability to irrigate. This type of irrigation is green technology (no pun intended) using the rivers energy to elevate the water.

The energy cost of a using a pumping station must be considered in your analysis.

Thank you for your consideration,

Todd Havener MD
Sent from my iPhone=

Commenter #33

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Kagan Breitenbach [redacted]
Sent: Thursday, June 27, 2013 9:45 AM
To: greg.allington@mcmillen-llc.com
Subject: Diversion Dam

To whom it may concern,

I am emailing to express that I am in favor of making a diversion dam on the Green River that would be passable with flat bottom boats such as rafts and dories. Please keep me updated as the project progresses.

Best Regards,

Kagan Breitenbach=

Commenter #34

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Von Bowerman [redacted]
Sent: Thursday, June 27, 2013 7:35 PM
To: greg.allington@mcmillen-llc.com
Subject: comments on the G.R. Diversion

Hi Greg

1) In the past the river trips below the diversion dam to the town of Green River is long and boring because of how slow of speed the river flows. Anybody that did take the trip will not take it again.

2) We are hearing a lot about putting in a hydro power plant in the new construction. I do not feel we need to change the plans to the point of falling out of the grandfathered protection that we have now. If anybody wants to add hydro they can tie into the large sluice gates that will be installed in the structure for sluicing sediment on the water wheel side and build a channel down the east side down stream like we have on the west side, so as to copy the west side pump and hydro structure that is in place now.

3) I want to keep the other comments from the last comment period to still be considered.
I still want to have the entire diversion dam a foot higher than the high side is now.

Thanks Von Bowerman

Commenter #35

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of [redacted]
Sent: Friday, June 28, 2013 8:59 AM
To: greg.allington@mcmillen-llc.com
Subject: decommission Tusher Diversion Dam

Dear Greg Allington,
Please decommission the Tusher Diversion Dam in the interests of aiding the aquatic ecology, safety, and local recreation economy.
Thanks,

Bob Brister
[redacted]

Commenter #36

Greg Allington

From: [redacted]
Sent: Wednesday, June 26, 2013 1:24 PM
To: greg.allington@mcmillen-llc.com
Subject: Water wheel at the Hastings ranch in Green River, Utah
Attachments: water wheel letter 23 June 2013.docx

Greg,

Here is a letter from Alice (Hastings) Peterson. I am a granddaughter of Effie and Howard Hastings, and Lawence Hastings' daughter.

Sincerely,

AliceH. Peterson

Greg Allington Mailto:Greg.Allington@McMillen-llc.com

To the question of making the water wheel at the Hastings Ranch un-usable, I would bring to your attention a publication entitled "Howard Laurence Hastings – Oral History" that was produced by the Human History Program, Grand County Preservation Commission. This was compiled from personal interviews by Bette L. Stanton, 683 Mountain View Drive, Moab UT, 84532, Phone 435 259 7809, Fax 435 719 4066, E-mail bls @lasal.net. There is a computer disk on file at the Dan O'Laurie Canyon County Museum and also at the Utah State Historical Society.

There is a chapter beginning on page 18 which talks about the history of water wheels on the Green River. On page 22 there is a photo of the Hastings Ranch water wheel. On Page 29, 30 there is an article from The Sun Advocate Lifestyle" by Layne Miller, staff writer.

There is a lot of History on the Hastings Ranch regarding the water wheel. It would indeed be sad to not try to protect this part of a colorful bygone era!

As a Hastings granddaughter and daughter I spent many summers on the Ranch and realized how special the Hastings Ranch was because of this beautiful wheel. Later on as a "grown up" I am continually amazed by the number of people that I meet who have visited the "water wheel ranch" on trips to Green River or have passed the wheel on trips down the Green River. Not to mention the practical value of using the wheel to help water the property.

Steel Water Wheel Designed by U. of Arizona

The Old Wooden Water Wheel Built in 1940

Sincerely yours,

Alice H. Peterson

400 – 36th Ave., Santa Cruz, CA 95062

Commenter #37

Greg Allington

From: Sindy Smith [sindysmith@utah.gov]
Sent: Tuesday, July 02, 2013 2:19 PM
To: Greg Allington
Subject: State Comment -- Green River Diversion Rehabilitation Project
Attachments: Green River Diversion Rehabilitation.doc

Greg,

The state comment concerning the Green River Diversion Rehabilitation project is attached.

Please contact me if you have any questions.

Sindy

--
Sindy Smith
RDCC Coordinator
Public Lands Policy Coordination Office
801-537-9193

State of Utah

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Office of the Governor
PUBLIC LANDS POLICY COORDINATION OFFICE

KATHLEEN CLARKE
Director

July 2, 2013

Greg Allington
McMillen, LLC
1401 Shoreline Drive
Boise, ID 83702

Subject: Green River Diversion Rehabilitation - Scoping Comments

Dear Mr. Allington:

The State of Utah, through the Public Lands Policy Coordination Office (PLPCO), has reviewed this project. Utah Code (Section 63J-4-601, et. seq.) designates PLPCO as the entity responsible to coordinate the review of technical and policy actions that may affect the physical resources of the state, and to facilitate the exchange of information on those actions among federal, state, and local government agencies. As part of this process, PLPCO makes use of the Resource Development Coordinating Committee (RDCC). The RDCC includes representatives from the state agencies that are generally involved or impacted by public lands management.

Department of Natural Resources
Division of Forestry, Fire and State Lands

The State of Utah owns the bed of the Green River in the project area by virtue of the Equal Footing Doctrine and several legal decisions including *United States v. State of Utah*, 283 U.S. 801 (1931), *United States v. State of Utah*, 283 U.S. 64 (1931), and *United States of America v. State of Utah*, Civil No. C-201-62 (D. Utah 1965).

Uses upon these sovereign lands must be consistent with the Public Trust doctrine. This doctrine ensures that these lands are managed for the benefit of the public. It has been interpreted broadly to protect navigation, recreational use, fish and wildlife habitat, and aquatic beauty on sovereign land. In addition, all uses must be consistent with state statutes and regulations. *See* Utah Code § 65A.

The Utah Division of Forestry, Fire, and State Lands ("Division") requires a permit for construction activities on the beds of sovereign lands. The NRCS should contact the Division to obtain a permit application.

The Division requests the NRCS to ensure that members of the public continue to enjoy the use of the Green River in the project area for recreational purposes. It is the understanding of the Division that a passage for boats was previously constructed. The Division requests that the NRCS continue to provide for recreational vessel passage in the area.

As the owner of the lands, the Division requests to be consulted regarding the particular details of the plan. Division employees will be able to consult with the NRCS to ensure that the proposed activities are consistent with the governing legal requirements.

The Division appreciates the opportunity to provide comments and input on a proposed project of this magnitude. If any questions or concerns arise regarding the contents of this response, please contact Laura Ault at 801.538.5540 or at lauraault@utah.gov.

The State of Utah appreciates the opportunity to review this proposal and we look forward to working with you on future projects. Please direct any other written questions regarding this correspondence to the Public Lands Policy Coordination Office at the address below, or call Sindy Smith at (801) 537-9193.

Sincerely,

Kathleen Clarke
Director

Commenter #38

Greg Allington

From: greenriver@mcmillen-llc.com on behalf of Nathan Fey [nathan@americanwhitewater.org]
Sent: Tuesday, July 02, 2013 4:48 PM
To: greg.allington@mcmillen-llc.com
Subject: Comments - Green River Diversion Rehabiliation Project
Attachments: Green River Rehab - NRCS Comments.pdf; ATT00402.htm

Mr. Allington,
Attached, please find a short letter providing comment on the Green River Diversion Rehabilitation Project.

AMERICAN WHITEWATER

Nathan T. Fey
Director
Colorado River Stewardship Program
1601 Longs Peak Ave.
Longmont, Colorado 80501
nathan@americanwhitewater.org

July 2, 2013

Greg Allington, Project Manager/Biologist
McMillen, LLC
1401 Shoreline Drive, Suite 100
Boise, ID 83702
RE: Comments on Proposed Green River Diversion Rehabilitation Project

Dear Mr. Allington,

American Whitewater is a national non-profit 501(c)(3) river conservation organization founded in 1954. We have nearly 7,000 individual members and over 100 club affiliates, representing over 80,000 whitewater paddlers and river enthusiasts from across the nation. American Whitewater's mission is to conserve and restore America's whitewater resources and to enhance opportunities to enjoy them safely. As a conservation-oriented paddling organization whose members enjoy the recreational opportunities the Green River has to offer, American Whitewater has a strong interest in the Green River Diversion Structure and, therefore, strongly encourages NRCS to include downstream boat passage at the dam to improve public safety.

The Green River is a high-value recreational resource in the upper Colorado River basin, and provides unique multi-day rafting and kayaking opportunities popular with a wide range of recreational users – particularly families. Below Flaming Gorge Dam, no major storage impoundments have been constructed on the river, and compared to other rivers in the region, irrigation diversions are minor – allowing for nearly un-impeded navigation from Flaming Gorge to the Colorado River Confluence. The Green River Diversion structure is the most significant in-channel obstruction on the main segment of the Green River, and starves fish of high quality habitat, while also creating a life threatening re-circulating hydraulic that presents significant danger to recreational paddlers at higher flows.

While American Whitewater has no recorded information on fatal accidents caused by Tusher Canyon Diversion in our database[1], we have been aware of numerous near-fatal incidents associated with the diversion structure and downstream hydraulic. Including downstream passage into the rehabilitation plan will eliminate the threat to public safety, while minimizing demands on emergency personnel. We ask that the NRCS and its project partners contact local law enforcement and search and rescue for more information on these non-fatal

[1] The American Whitewater Accident Database is a nation-wide collection and analysis of whitewater accidents and close calls. This database, while extensive, is not complete. A significant number of accidents are not reported to us. http://www.americanwhitewater.org/content/Safety/view/

incidents, and to incorporate safe passage into the final project proposal to eliminate these existing risks.

Thank you in advance for considering a range of improvements to the Green River Diversion Structure. American Whitewater applauds the efforts of NRCS and its partners to eliminate a physical barrier to fish seeking to migrate through the site, while also creating safe passage for rafters, kayakers, and canoeists enjoying the outstandingly remarkable recreational opportunities the Green River provides. It is critical that the project meet the needs of local irrigators, while minimizing threats to public safety. Please contact me if you have any additional questions.

Sincerely,

Nathan T. Fey
Colorado River Stewardship Director
American Whitewater

Comment 39

United States Department of the Interior
FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

July 1, 2013

In Reply Refer To:
FWS/R6
ES/UT
09-I-0217

Mr. Bronson Smart, State Engineer
Natural Resource Conservation Service
125 S. State Street – Room 4010
Salt Lake City, UT 84138-1100

RE: Green River Diversion Rehabilitation, Grand & Emery Counties, Utah; EIS Scoping Comments

Dear Mr. Smart:

On June 3, 2013, we received your Notice for a 2nd Scoping Period for the rehabilitation of the Green River Diversion (Diversion), which spans the Green River upstream of the town of Green River, Utah. We appreciate the coordination between our offices and your support of endangered species considerations during the preliminary discussions concerning this project. As we further describe below, it is important that the rehabilitation of the Green River Diversion consider impacts to federally listed fish species. In response to your scoping notice, we submit the following comments pursuant to our authorities under the National Environmental Policy Act and the Endangered Species Act (ESA) of 1973.

Importance of the Green River to endangered fish recovery

Four federally endangered species inhabit the Green River: bonytail (*Gila elegans*); Colorado pikeminnow (*Ptychocheilus lucius*); humpback chub (*Gila cypha*); and razorback sucker (*Xyrauchen texanus*). Portions of the Green River are designated as critical habitat to all four species; the entire length of the Green River and its 100 year floodplain is designated as critical habitat for at least one species between the Yampa River confluence and the Colorado River confluence (Appendix A)[1]. Furthermore, the Diversion is located within critical habitat for the Colorado pikeminnow and razorback sucker, and directly downstream of Desolation Canyon, which is designated critical habitat for the bonytail and humpback chub.

The Green River Basin, particularly the mainstem Green River, is vital to the recovery of these four species. Maintaining self-sustaining populations in the Green River is a recovery goal for all four

[1] For a detailed description of the critical habitat reaches, please see the Federal Register: 59 FR 13374

species (U.S. Fish and Wildlife Service 2002a, 2002b, 2002c, 2002d). Currently, the Green River Basin harbors:

- the largest, most productive, and most robust population of the Colorado pikeminnow;
- two known, active spawning locations of the Colorado pikeminnow;
- two known population centers of humpback chub;
- two known, active spawning locations of the razorback sucker; and
- populations of stocked individuals of razorback sucker and bonytail;

These four species are adapted to desert river hydrology (characterized by large spring peaks of snow-melt runoff and low, relatively stable base flows) and long, unimpeded stretches of river. Unimpeded stretches of river are crucial to the life histories of these species in order to support migrations of spawning individuals, drifting of newly produced young-of-year fish, and home-range expansion of juveniles. Specifically, razorback sucker and Colorado pikeminnow annually migrate to established spawning areas to reproduce (U.S. Fish and Wildlife Service 2002b, 2002d). Individuals travel long distances to reach these sites (745 river kilometers round-trip on record for Colorado pikeminnow) (U.S. Fish and Wildlife Service 2002b). Colorado pikeminnow spawn in two principal sites: Gray Canyon in the lower Green River; and the lower Yampa River (U.S. Fish and Wildlife Service 2002b). Known spawning sites for razorback sucker are located in the lower Yampa River and in the Green River near Escalante Ranch, but other, less-used sites are probable (U.S. Fish and Wildlife Service 2002d). Because all of the spawning sites are upstream of the Diversion, any individual fish that occurs downstream of the Diversion (or in the Colorado River) must pass over the Diversion to reach these spawning sites (and conversely must pass over it in the downstream direction to return to their home range).

After viable eggs are produced at spawning areas, eggs hatch into larval fish. Larval fish remain in the river substrate for about a week and then emerge into the water column. Larval fish are very small (<0.5 inches total length) and incapable of directed swimming from the time of hatching through the first 2-4 weeks of their life. As a result, they drift downstream with the current, ending up in slow water habitats where they can grow and achieve swimming ability. Because the Diversion is downstream of spawning locations, many larval fish pass over the Diversion each year. This input of larval fish makes the lower Green River an important nursery area for young fish.

As young fish in the lower Green River grow and reach sexually maturity, they require an ability to migrate to spawning locations and other new habitats. In fact, juvenile fish in the lower Green River commonly leave this area and establish new home areas upstream. Increased recruitment[2] that resulted in increased abundance of adult Colorado pikeminnow in the Green River Basin in 2006 to 2008 likely originated from a large year class of age-0 Colorado pikeminnow produced in the lower Green River during 2000 (Bestgen *et al.* 2010). Furthermore, population studies indicate that many small Colorado pikeminnow leave the lower Green River and immigrate into upstream areas such as Desolation Canyon and the White River (Bestgen *et al.* 2010). Overall transition rates reflect a general movement pattern of Colorado pikeminnow from Desolation-Gray Canyon and the lower Green River into upstream reaches; this trend demonstrates that young fish reared in the lower Green River support populations of adult fish throughout the Green River basin (Bestgen *et al.* 2010).

[2] Recruitment is defined as an organism transitioning from an immature individual to a sexually mature individual; thus becoming a reproductively active member of the population

As you can see, maintaining connectivity between population centers and spawning sites is vital to reaching the de-listing goals of self-sufficient populations of these endangered fish species for a variety of biological reasons.

Considerations for the Green River Diversion rehabilitation

In the course of designing any future modifications to the Green River Diversion, it is important to consider how the modifications may impact the endangered fish species and how the impacts may be avoided, minimized, or mitigated. We foresee the following considerations as being important for any design modification:

1. *Fish Passage* – Providing safe, effective fish passage for both up- and downstream movements year-round in most years;
2. *Reducing Construction Impacts* – Avoiding impacts whenever feasible by following proper construction BMPs, work timing, material selection, and de-watering protocols;
3. *Maintaining Habitat* – Maintaining suitable habitat in the project vicinity, by providing adequate hydrological, thermal, and chemical conditions; and
4. *Electrical Barrier Component* – Assisting the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) in the effective design, construction, and operation of an electric barrier to prevent fish entrainment into the Green River Canal and Thayn Hydroelectric facility.

Fish Passage

As described in detail above, it is critical to species recovery that the Green River Diversion does not act as a barrier to fish movement. If individuals are prevented from migrating up- and downstream, the populations of the four species will be heavily impacted. We have spoken with your office about designing an appropriate suite of fish passage options, including an upstream passage on river left (near the water wheel), downstream fish passage 'notches', and a fish return system from the 'raceway'[3] section.

Designing fish passage for native, warm-water fishes requires special design criteria because these species are not equipped with strong burst speeds or jumping abilities. Therefore, fish-ladders (or other structures designed for salmonids) will not work for these species. Fish passage design must take into account native fish swimming ability, which is related to body size. At this time we believe any upstream fish passage must be able to move individuals that are 200 millimeters and longer. This size requirement should allow the smallest juvenile fish (and therefore the weakest swimmer) that might leave the lower Green River to access upstream habitats.

In addition, designs must analyze flows available inter- and intra-annually, to ensure that flows will be available year round to operate the facility. In other words, the fish passage options must work year round, under a variety of flow regimes, in the vast majority of years. Most importantly the fish passage must work in the majority of dry years, when little flow is available at the Diversion. However, our office understands that the fish passage should not infringe upon any existing water right in the local area, so passage operation will need to be closely monitored.

[3] The large channel that takes water to both the Green River Canal and Thayn Hydroelectric facility

We have recently seen comments requesting downstream boat passage at the structure. We have no opposition in principle to boat passage – in fact scientific research crews would likely benefit from the use of such a boat passage. However, we strongly emphasize that any boat passage design must be able to maintain the important fish passage components. That is, the design of a boat passage must ensure that proper water velocities and quantities are maintained at the fish passage, and funds are still available to construct the fish passage. Any reduced function of a fish passage structure would be considered in an inter-agency consultation under the Endangered Species Act.

We believe that designing an effective set of fish passage options is quite feasible. We are encouraged by initial discussions with your office that demonstrate the potential for such structures. We would like to continue coordinating and working with your office's engineers to help design a long-lasting Diversion that will support water use and benefit native fish species.

Construction Impacts

Once a preferred alternative is chosen for the Diversion rehabilitation, it will be important for our offices to work closely on appropriate construction methods to reduce impacts to the river and to individual fish. When working in designated critical habitat it is important to choose the least impactful techniques for accomplishing effective construction. Usually the least impactful timing for construction is in the fall, as the reproductive season has ended and flows are safer for construction crews.

The de-watering component of the project is a key decision that will affect construction and fish. We support using the existing structure as a possible de-watering feature, as it may reduce the impact of installing new de-watering structures. Whatever de-watering option is chosen, we ask that it not act as a fish passage barrier, that it be cleared of fish trapped inside before work begins, and that it not contribute large sediments loads to the downstream areas.

Maintaining Habitat

It is important that suitable habitat for endangered fish species is maintained in the vicinity of the Diversion after the project is complete. In fact, because this stretch of river is designated critical habitat for the razorback sucker and Colorado pikeminnow, a project cannot adversely modify the habitat. We have specific habitat criteria, called primary constituent elements (PCEs) for the designated critical habitat in the Green River.

Water, physical habitat, and the biological environment are the PCEs of critical habitat for these fish species. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment.

Habitat in the vicinity of the project would need to remain suitable for endangered fish. For this project, habitat condition is largely controlled by flows in the river channel. Habitat conditions regulated by flows that must be considered include, but are not limited to:

- Adequate water depth for fish movement, both over the diversion through a passage facility and local movement across the river channel; and
- Suitable chemical conditions, such as temperature, dissolved oxygen, and pollution levels.

Proper water management at the Diversion will ensure that the project does not dry dam the Green River. Dry damming the river will result in significant entrainment issues and effectively remove habitat from that portion of the river. Analyses must be conducted to clearly identify the flows necessary to provide adequate habitat for the endangered fish downstream of the Diversion.

Electrical Barrier Component

It is the responsibility of the Recovery Program to enact a project that reduces the existing entrainment of fish into the Green River Canal and Thayn Hydroelectric facility. After careful deliberation, the Recovery Program has chosen to fund the construction and operation of an electric barrier that inhibits fish entrainment into these facilities by creating an electric field which irritates fish and compels them to leave the area. The Recovery Program believes that this electric barrier is a superior option to an alternative of installing a physical rolling drum screen structure because it will offer more effective entrainment prevention and will not negatively affect water use in the area.

Because the two projects (the Diversion rehabilitation and the electric barrier) will each benefit if designed, constructed, and operated as one, your office and the Recovery Program have been in consistent discussions about the electrical barrier component. We applaud your early coordination that will ensure that both projects are congruous.

To enact the project, the Recovery Program will fund the design, construction, and operation of the electrical barrier components. To assist in this process your office has agreed to consider these design, construction, and operation components in your project planning. To ensure successful implementation of both projects, please continue this coordinated effort. The effective operation of the electric barrier is a key component of species recovery, and your assistance in the project is greatly valued.

Conclusion

We appreciate your office's continued coordination with us concerning this project. Through the entire process, your office has been very supportive of ideas to promote native species. Thank you for the opportunity to comment on this project. We look forward to working with you in the future. If you have any questions or need further information please contact Kevin McAbee at (801) 975-3330 extension 143.

Sincerely,

Larry Crist
Utah Field Supervisor

cc: Upper Colorado River Endangered Fish Recovery Program; Attn: Tom Chart

Region 6 RO; Attn: Dave Carlson

Lisa Chetnik Treichel
DOI Office of Environmental Policy and Compliance
1849 C Street, NW --MS 2462-MIB
Washington, DC 20240

Stephanie M. Nash, Environmental Protection Specialist
Division of Habitat and Resource Conservation
Branch of Conservation Planning Assistance
4401 North Fairfax Drive, ARLSQ-840J
Arlington, VA 22203

Literature Cited

Bestgen, K. R., J. A. Hawkins, G. C. White, C.D. Walford, P. Badame & L. Monroe. 2010. Population Status of Colorado pikeminnow in the Green River Basin, Utah and Colorado, 2006-2008. Colorado River Recovery Implementation Program Project Number 128. 112 pages.

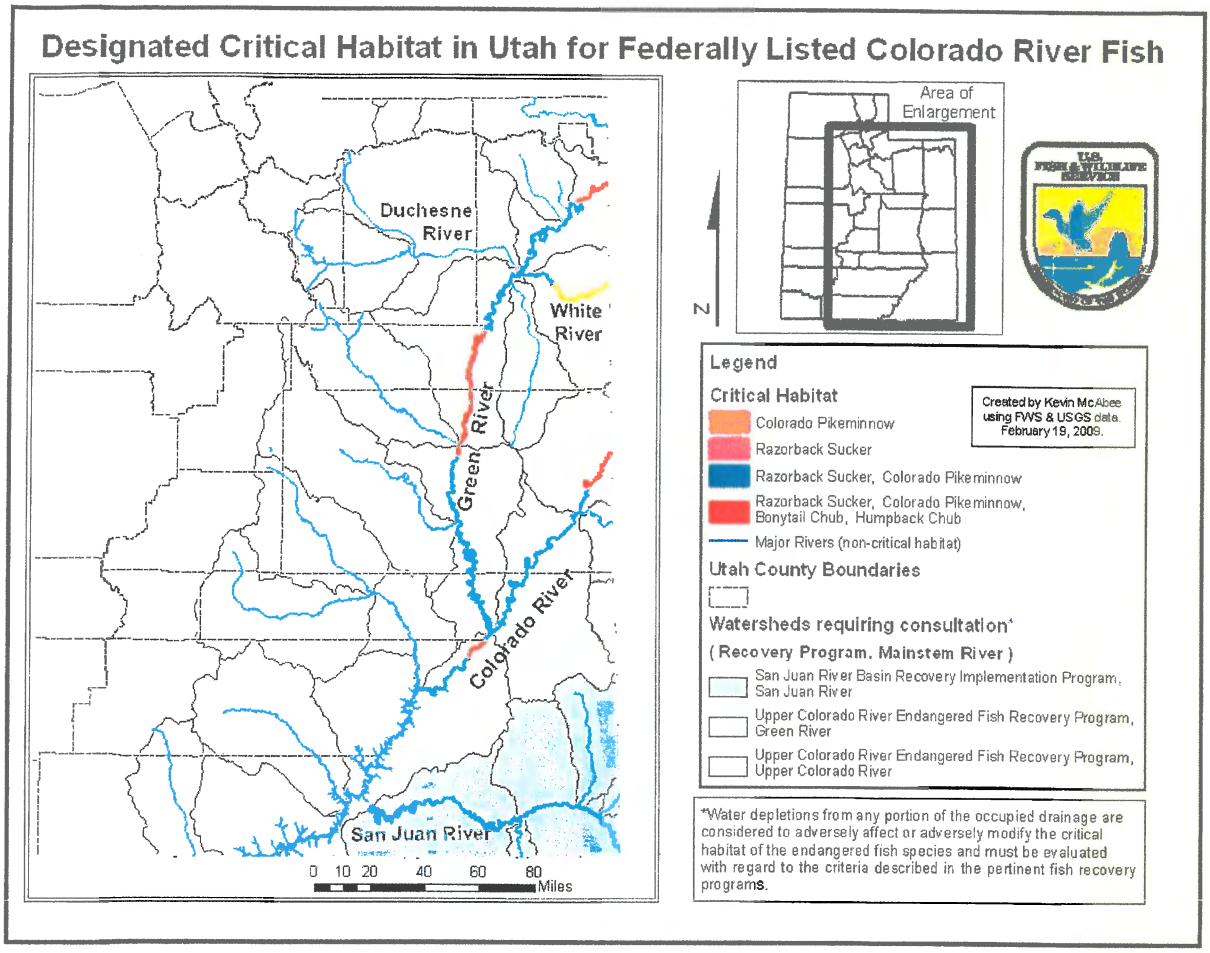
U.S. Fish and Wildlife Service. 2002a. Bonytail (*Gila elegans*) Recovery Goals: amendment and supplement to the Bonytail Chub Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 97 pages.

U.S. Fish and Wildlife Service. 2002b. Colorado pikeminnow (*Ptychocheilus lucius*) Recovery Goals: amendment and supplement to the Colorado Squawfish Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 111 pages.

U.S. Fish and Wildlife Service. 2002c. Humpback chub (*Gila cypha*) Recovery Goals: amendment and supplement to the Humpback Chub Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 107 pages.

U.S. Fish and Wildlife Service. 2002d. Razorback Sucker (*Xyrauchen texanus*) Recovery Goals: amendment and supplement to the Razorback Sucker Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 113 pages.

Appendix A


Designated Critical Habitat in Utah for Federally Listed Colorado River Fish
Duchesne River
White River
Green River
Colorado River
San Juan River
0 10 20 40 60 80
Miles
Area of Enlargement
N
Legend
Critical Habitat
Colorado Pikeminnow
Razorback Sucker
Razorback Sucker, Colorado Pikeminnow
Razorback Sucker, Colorado Pikeminnow, Bonytail Chub, Humpback Chub
Major Rivers (non-critical habitat)
Utah County Boundaries
Watersheds requiring consultation*
(Recovery Program, Mainstem River)
San Juan River Basin Recovery Implementation Program, San Juan River
Upper Colorado River Endangered Fish Recovery Program, Green River
Upper Colorado River Endangered Fish Recovery Program, Upper Colorado River
Created by Kevin McAbee using FWS & USGS data. February 19, 2009.
*Water depletions from any portion of the occupied drainage are considered to adversely affect or adversely modify the critical habitat of the endangered fish species and must be evaluated with regard to the criteria described in the pertinent fish recovery programs.

APPENDIX B – CONCEPTUAL DESIGN

Final Concept Design Report

Hydrology Technical Memo

NRCS, Utah

Green River Dam Rehabilitation Project

Concept Design Report

Final

Dan Axness, PE
Project Manager

McMILLEN, LLC

March 2014

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SECTION 1
INTRODUCTION

1.0 Introduction

The Natural Resources Conservation Service (NRCS) - Utah contracted McMillen, LLC (McMillen) to provide engineering services to plan and prepare a concept design for the rehabilitation of the Green River Diversion Dam located in Emery and Grand Counties, Utah. The following report consists of project alternative descriptions and a detailed analysis of the existing physical site resources. The report also describes the hydraulic evaluations conducted in order to compare the performance of each of the project alternatives against existing conditions. Finally, the report includes an economic evaluation of the various alternatives and offers a Proposed Alternative for the project. The purpose of the report is to present information that supports the formulation, evaluation, and conclusions of the concept design project.

1.1 Background

The Green River Diversion Dam is located approximately six miles upstream of the town of Green River, Utah. The dam[1] was originally constructed in 1906 and consisted of a wood cribbing filled with rock, but was later capped in 1936 with cast-in-place concrete to form a broad-crested weir, lending the dam its present form (Cavalli 2000). The existing structure spans the width of the river, approximately 755 feet, and diverts approximately 819 cfs to irrigators on either side of the river. Water is also diverted into a powerhouse raceway for use in a downstream hydropower facility before being discharged back into the river. The original diversion structure was constructed in the early 1900s and has been modified over the years to maintain the integrity of the structure. During the 2010/2011 flood events, however, flows in the Green River caused severe damage to the diversion structure, compromising its structural integrity. If the dam were to fail, water service to two irrigation canals,
a historic irrigation water delivery system, and a hydropower plant would be eliminated. Rehabilitating the dam would result in these resources remaining open and usable.

The purpose of the project is to rehabilitate the existing diversion dam. The need for the project is to maintain existing functions of the diversion dam for water delivery to irrigation canals and the hydropower plant's powerhouse.

NRCS and the Utah Department of Agriculture and Food (UDAF), as the project sponsors, are analyzing alternatives to repair damage to the Green River Diversion Dam from the 2010/2011 flood events. The Proposed Alternative for this rehabilitation is designed to divert water to irrigation and hydropower while maintaining and improving upstream and downstream fish passage. The overall design of the Proposed Alternative includes the following detailed objectives:

1. Replace existing diversion structure with similar structure downstream that has equivalent weir length.
2. Increase structure crest elevation approximately one foot to ensure water delivery to both east and west canals.
3. Provide upstream fish passage past diversion structure.
4. Provide downstream fish passage past diversion structure.
5. Provide an electric barrier (e-barrier) and bypass to prevent fish from moving into irrigation systems.

[1] *Dam* and *diversion structure* will be used interchangeably in this report to refer to the Green River Diversion Dam.

6. Provide passive integrated transponder (PIT) tags to sense and record fish movement over and around the diversion.
7. Provide means to sluice sediment at east and west ends and to provide added floodwater conveyance.
8. Provide both dry and wet downstream boat passage along east side.
9. Replace raceway water control gates with new radial gates.

Note that the e-barrier and raceway fish bypass channel are considered separate from this project and are therefore not analyzed in this report.

1.2 Scope

McMillen was contracted to provide the following scope of services for the project:

- Prepare an Environmental Impact Statement (EIS) to include the completion of the necessary environmental and economic impact analyses per requirements of the National Environmental Policy Act (NEPA).
- Develop the following Green River Diversion Dam Rehabilitation alternatives in accordance with the Emergency Watershed Protection (EWP) Program requirements:
    - No Action
    - Structural Rehabilitation of the existing dam
    - Additional alternatives developed from the scoping meeting
- Provide concept design plans for each of the alternatives.

1.3 Site Information

Table 1-1 lists pertinent information regarding the diversion dam location.

Table 1-1. Site Information

Item	Information
Existing Diversion Dam Crest Centerline	Total length of 755 ft
Legal Description	Section 17, Township 20 South, Range 16 East, SL Base & Meridian
Counties	Emery/Grand Counties
Nearest City	Green River, UT

1.4 Alternative Descriptions

The following section includes descriptions of the four alternatives selected for detailed study, components common to each of these alternatives, and those alternatives that were considered, but eventually eliminated from consideration for further study. Figure 1-1 below depicts the orientation of each of the four alternatives overlain over an aerial image of the project area. More complete descriptions of each alternative are given in the Concept Design Drawings (Appendix A).

1.4.1 Alternative 1—Replace Diversion Dam Downstream

Alternative 1 replaces the diversion dam at a downstream location. The weir length will remain the same as the existing dam. This alternative is easier to construct than any of the other alternatives that have been proposed, due to the relative location of the existing diversion dam and its potential for use as a diversion berm during construction. It should be noted, however, that the construction means and methods represented here, and depicted in the design drawings, are conceptual in nature, and do not necessarily represent the construction means and methods selected by the engineer and/or construction contractor during final design. The downstream alternative will maintain the existing east side tie-in location to the bank and is designed with an equivalent weir length to the existing weir. Thus, due to the flatter alignment of the dam, the diversion structure will connect on the west side farther down the bank of the Green River Canal than does the existing structure.

1.4.2 Alternative 2—Replace Diversion Dam Upstream

Alternative 2 has a more curved horizontal alignment than either Alternative 1 or the existing alignment. This alignment will help to focus flow velocities toward the center of the channel, protecting the banks from erosion and providing the potential to more efficiently remove mid-channel sediment deposition from Tusher Wash. However, this alternative will be more difficult and costly to construct due to the longer length of weir and the construction of an additional diversion berm for dewatering. It should be noted, however, that the construction means and methods represented here, and depicted in the design drawings, are conceptual in nature, and do not necessarily represent the construction means and methods selected by the engineer and/or construction contractor during final design. Furthermore, due to the more pronounced curvature of the structure, the diversion may cause shifts in scour and deposition patterns immediately downstream of the structure under this alternative.

1.4.3 Alternative 3—Replace Existing Diversion Dam

Alternative 3 replaces the existing diversion dam along the current alignment. This alternative has the same construction challenges as Alternative 2 and also requires that the existing weir be removed prior to construction of the new dam. It should be noted, however, that the construction means and methods represented here, and depicted in the design drawings, are conceptual in nature, and do not necessarily represent the construction means and methods selected by the engineer and/or construction contractor during final design. Replacing the existing diversion dam will maintain the historic visual appearance of the project site more than either of the previous two alternatives. Thus, this alternative has an inherent cultural and historical value greater than Alternatives 1 and 2.

1.4.4 Alternative 4—Repair Existing Diversion Dam

Alternative 4 would repair the existing diversion dam in order to provide the required water allocations, and upstream fish passage and boat passage; however the lifetime of a repaired structure is uncertain due to the unknown structural stability of the existing structure. The existing structure causes a large amount of seepage through and under the weir and is not considered to be structurally sound. Repairing the existing diversion dam will maintain the historic visual appearance of the project site more than Alternatives 1 and 2. Thus, this alternative has an inherent cultural and historical value greater than Alternatives 1 and 2.

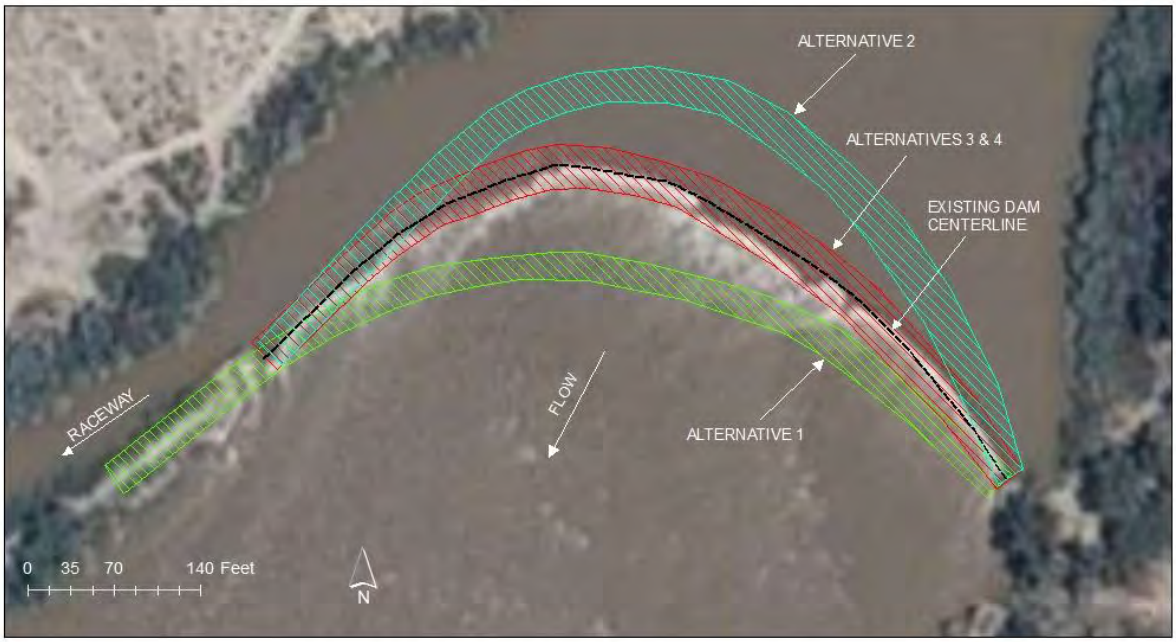

Figure 1-1. Project Alternative Alignments

1.4.5 Project Components Common to All Alternatives

Upstream Fish Passageway — The upstream fish passageway would be located on river left and would start conveying water at elevation 4087' (i.e. flows above 849 cfs). The passageway is 10 feet wide and approximately 180 feet long and bounded on the sides and bottom with cast-in-place concrete. The bottom of the passageway would be lined with cobble- and boulder-sized riprap.

Downstream Fish Passage Notches — There would be three 10-foot wide fish passage notches along the crest of the dam. The notches would be separated by approximately 140 feet, with the middle notch centered along the dam crest. Each notch would be outfitted with Passive Integrated Transponder (PIT) tag readers in order to collect data on the movement of fish species of interest. The notch inverts would be at elevation 4087'; however, the notches would have stop-logs capable of ensuring that flow through the notches was not triggered until upstream fish passage was provided sufficient flow.

Dam Crest Sluice Gates — Sluice gates would be placed on either side of the dam in order to provide periodic sediment maintenance to the project and to protect flood capacity through the dam during high-flow events in order to limit the amount of upstream flooding on such occasions. The gates could be operated manually or electronically, and could require local access or could be operated remotely. The gate inverts would be set to 4082'; the gates for each side of the river would have a total width of approximately 50 feet.

Boat Ramp — A boat passageway would be constructed on river left, adjacent to the upstream fish passage structure. The ramp would be 20 feet wide and would include concrete steps on both the upstream and downstream sides in order to provide dry portage during times of low-flow. The ramp would contain a bladder weir along its crest capable of regulating the flow through the ramp. The bladder weir could be operated from the bank or from the river. The invert of the ramp, and the lowest elevation at which the bladder weir could be set, would be 4087'. The ramp would be approximately 72 feet long and would be contained by concrete walls and slab. The interior of the ramp (between the steps and the slab) would

contain compacted structural fill. Boat passage would not be triggered until the flow rate was above 939 cfs.

Raceway Gate Rehabilitation — The "8-Gate" structure currently regulating flow into the west side raceway would be rehabilitated in order to provide motor vehicle access to the rehabilitated dam and to improve the operations of the diversion.

East Side Canal Sluiceway and Fish Bypass — A bottom-outlet sluicing and fish bypass structure would be constructed along the east side canal near the bend in the Green River about 2500 feet downstream of the existing dam.

1.4.6 Alternatives Considered but Eliminated from Further Study

The alternatives provided in the following table were considered but not chosen for additional study and development because of the disadvantages listed.

Table 1-2. Alternatives Considered but Eliminated from Further Study

Alternative	Description	Advantages	Disadvantages
Stoplog Dam	Using approximately the same orientation as the existing dam, a cross-channel stoplog dam would be installed at the existing location, or slightly upstream or downstream. The stoplogs would be inserted into concrete piers and the length of the diversion would be protected both upstream and downstream with sheet pile.	A stoplog dam would be relatively cheap to design and build.	Operation and maintenance of a stoplog dam would be more demanding than the existing conditions.
Dam at Canyon Outlet	Construct an earthen or concrete dam from 5 to 10 miles upstream of the existing structure within the Green River Canyon and up to 30 feet high. Construct a canal along the eastside road and provide an aqueduct across the river to service the westside. Decommission the existing dam, buy out Thayn Hydropower, and provide hydropower from the dam to the community of Green River, UT.	The hydropower production potential of the project would be much greater.	Although this concept would meet the purpose and need of the project, it would be prohibitively expensive. Also, excess hydropower production is outside the scope of the project.
Bladder Weir	Using approximately the same orientation as the existing dam, a cross-channel bladder weir would be installed at the existing location, or slightly upstream or downstream. The bladder weir would be installed on a concrete foundation and would come in sections that connect to concrete walls. The weir would be protected both upstream and downstream with sheet pile.	Fish and boat passage would be fairly straightforward. Also, sediment sluicing could be realized.	This concept may be prohibitively expensive to operate and maintain. Also, vandalism could potentially shut down the entire project.
Straight Concrete Diversion	Construct a dam straight across the channel but otherwise containing the same features as Alternatives 1 through 4.	This design would provide fish and boat passage and would divert water to the canals. Also, O&M would be fairly straightforward.	Extra bank protection would be needed downstream due to the scouring effect of flows over the dam near the connection with the banks. Also, erosion of the mid-channel would likely occur, contributing to loss of vegetation and increases in transported sediment downstream.
Downstream Arcing Diversion	Construct a dam across the channel with the apex of the arc downstream rather than upstream and otherwise containing the same features as Alternatives 1 through 4.	This design would provide fish and boat passage and would divert water to the canals. Also, O&M would be fairly straightforward.	Extra bank protection would be needed downstream due to the scouring effect of flows over the dam near the connection with the banks. Because of the orientation of the dam, this effect may be seen far downstream. Therefore, this alternative may be prohibitively expensive. Also, bank erosion would contribute to losses in vegetation and increases in transported sediment downstream.
Riprap Ramp	Take out the existing dam and construct a riprap ramp that begins at the diversion location and extends downstream at a steeper slope. Construct fish depressions and a navigation chute in order to provide fish and boat passage, respectively.	Cost sharing may be available for riprap. O&M would be simple. Boat passage would be provided.	Sediment would accumulate behind the ramp and could clog the raceway entrance. The stability of the structure during a high-flow event is less certain than with other alternatives. Also, the ability of the structure to provide hydraulics amenable to fish passage is questionable. Flooding may occur upstream that is greater than existing conditions.
Rock Weir Series	Take out the existing dam and construct a series of rock weirs upstream of the diversion at grade in order to provide a sequence of roughness elements that act to deepen and divert the water at lower flows.	Cost sharing may be available for riprap. Fish passage could be provided. O&M would be simple.	Boat passage would not be provided. Sediment would accumulate behind the weirs. The expected life of each of the weirs would be uncertain. It may be expensive to design the hydraulics of the structures. Flooding may occur upstream that is greater than existing conditions.
Riprap Ramp Series	Take out the existing dam and construct a series of riprap ramps upstream of the diversion at grade in order to provide a series of roughness elements that act to deepen and divert the water at lower flows.	Cost sharing may be available for riprap. Fish passage could be provided. O&M would be simple.	Sediment would accumulate behind the ramps. The stability of the structures during a high-flow event is less certain than with other alternatives. Also, the ability of the structures to provide hydraulics amenable to fish passage is questionable. Flooding may occur upstream that is greater than existing conditions.

Alternative	Description	Advantages	Disadvantages
Far Upstream Diversion	Construct a low diversion dam further upstream and provide canals that connect to the existing eastside and Green River canals.	The diversion dam would be lower and would not accumulate as much sediment behind it. Fish and boat passage would be provided.	Connecting the diversion to the existing canals would require canal connections which, depending on the structure's distance upstream, could be prohibitively expensive. The project footprint would be larger, potentially impacting environmental resources.
Decommissioning, Pumping and Buyout	Decommission the dam, buy out Thayn Hydropower, and provide pumping for the irrigators. Offset energy requirements during irrigation season with solar arrays; sell back excess power in the off-season. Establish an endowment to fund the remaining O&M costs of the project for its lifetime.	Fish and boat passage would be provided. The river would be restored to a natural condition.	Pumping could be unreliable and costly. Costs to buy out Thayn Hydropower could be prohibitive. O&M could be complicated and costly.
Low Diversion and Buyout	Reconstruct a lower diversion dam at the existing location, or slightly upstream or downstream, and buy out Thayn Hydropower.	Fish and boat passage would be provided more readily. The river would be restored to a more natural condition.	Costs to buy out Thayn Hydropower could be prohibitive.
Water Park Style Diversion	Back up water starting far upstream by introducing a series of roughness elements scattered across the river that could double as a whitewater park.	Cost sharing may be available for riprap. Fish passage could be provided. O&M would be simple. Boat passage would be provided and recreation would be enhanced.	The expected life of each of the project components would be uncertain. It may be expensive to design the hydraulics of the structures. Flooding may occur upstream that is greater than existing conditions.
Alts 1-3 with Hasting Berm Improvement	Raise the berm on the east side of the river adjacent to Hastings Ranch and provide a rock or tile drain system parallel to the berm to reroute seepage water back into the river and away from Hastings Ranch; additionally, implement one of the four alternatives.	Provides extra protection to Hastings Ranch from flooding.	Alternatives 1-3 already provide protection from flooding that surpasses the existing structure. Funding for this addition to Alts 1-3 may be problematic.
Alts 1-3 with Hastings Field Drain Outlet	Regrade Hasting Ranch as needed and provide a stable outlet for any seepage or overtopping water that enters the field; additionally, implement one of the four alternatives.	Provides extra protection to Hastings Ranch from flooding.	Alternatives 1-3 already provide protection from flooding that surpasses the existing structure. Funding for this addition to Alts 1-3 may be problematic.

SECTION 2
SITE ANALYSIS

2.0 Introduction

The following section provides an analysis of the existing physical resources located within the project area that would be affected by the project alternatives. The resources analyzed include:

- Surface Water
- Ground Water
- Geology

2.1 Surface Water

The Green River Diversion Dam is approximately 8 feet above grade, 20 feet long in the direction of flow, and spans the Green River along a 755-foot-long arc. The dam is designed to back up and divert water into canals on either side of the river. On the west side of the river, diverted water travels through a headgate and down the canal (raceway) approximately 0.4 miles, where a portion of it is pumped into the Thayn and Green River Canals. The rest of it passes through a small hydroelectric powerhouse. On the east side of the river, portions of water are allocated to a water wheel, the East Side Canal, and a fish ladder. At normal flow and above, the remainder of the Green River water passes over the dam and continues downstream.

This section describes the surface water resource in the project area, and includes a hydrologic analysis of the watershed, and discussions of surface water quality, the existing water rights in the project area, and sedimentation.

2.1.1 Surface Water Flow

The Green River Watershed is nested within the Colorado River Watershed, which serves about 27 million people and irrigates nearly 4 million acres of land across several states of the Western United States (Gerner et al. 2006). Table 2-1 gives important basin characteristics of the Green River Watershed above the Green River Diversion Dam. Surface waters of the Green River originate across a 40,500 mi^2 basin which includes parts of Wyoming, Utah, and Colorado. USGS Gaging Station 09315000, located approximately 8 river miles downstream of the diversion dam near Green River, UT, has a 111-year record of discharge that indicates an average daily flow rate of 6,085 cfs. However, flow in the Green River is partially regulated by Flaming Gorge Dam, located about 290 miles upstream of the diversion dam. Flaming Gorge Dam was completed in 1964, so that only including flow data from 1964 and later would account for the attenuating effect the dam has on Green River flows. This leads to an average daily flow of approximately 5,537 cfs.

Table 2-1. Basin Characteristics of the Green River Watershed above the Green River Diversion Dam

Basin Parameter	Value
Area (sq. mi.)	40,500
Mean Basin Elevation (ft)	7,230
Mean Annual Precipitation (in.)	15.9
Average Basin Slope (%)	12.9

The average peak annual flow rate for the Green River near the diversion dam is 28,249 cfs, based on a 110-year period of record. However, since the completion of Flaming Gorge Dam in 1964, this peak annual flow has dropped to 23,012 cfs, as indicated in Figure 2-1. The figure also shows several large events since the completion of Flaming Gorge Dam; specifically, 48,300 cfs in 1984, 44,800 cfs in 1983, and 44,000 cfs in 2011, all of which reached flood stage. The latest flooding event, in 2010/11, flooded some areas of farmland, pasture, and parts of a nearby golf course, and required riprap and sandbag protection of some homes. Of the 110 years of peak annual flows available, 97% occurred in either May or June.

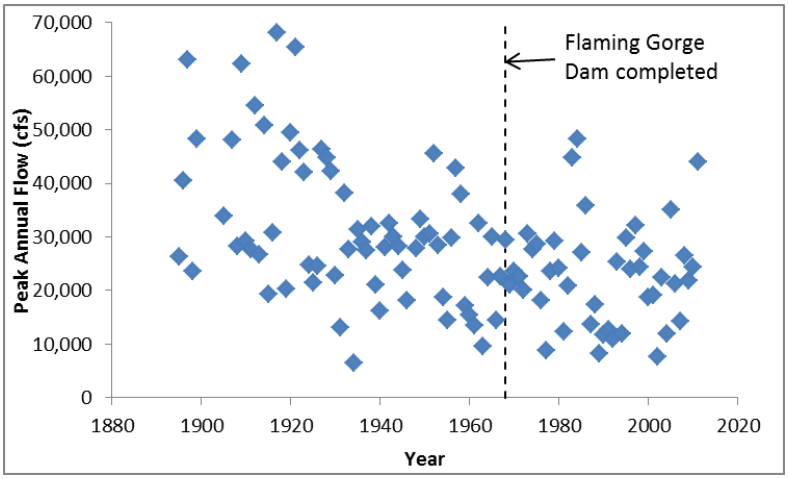

Figure 2-1. Peak Annual Stream Flow at USGS Gage 09315000 at Green River, UT

The mean basin elevation of the Green River Watershed is 7,230 feet, suggesting that the basin develops a snowpack during the winter months, which then contributes to surface water as snowmelt in the spring and summer. An investigation of six snow telemetry (SNOTEL) sites throughout the basin indicates a mean maximum average monthly snow water equivalent (SWE) of 15.4 inches. SWE is an estimate of the equivalent depth of water that a given depth of snow would produce if melted. Because snow accumulates, the maximum average monthly SWE is indicative of the total volume of snow accumulated throughout a water year. SWE data are given in Table 2-2 for the six sites. From the table, the average elevation of the sites is 8,430 feet, which is appreciably higher than the basin average. The area of the basin above 8,430 feet is approximately 6,200 mi^2, which, at 15.4 inches of depth, leads to an average yearly flow rate of 7,026 cfs. This is higher than the average flow rate calculated using gage data. However, it does not account for losses due to evaporation, transpiration, infiltration, impoundments, or irrigation diversion. What it does indicate, though, is that snowmelt factors largely in the hydrology of the basin, and that snowmelt is responsible for both the peak of the hydrograph occurring in late spring, and the possibility of large-scale flooding due to rain-on-snow events (Kenney et al. 2007).

Table 2-2. Average Snow Water Equivalent (SWE) Data for 6 Sites in the Green River Basin above the Green River Diversion Dam

SNOTEL Site Number (State)	Max. Avg. Monthly SWE (in.)	Site Elevation (feet)
460 (WY)	13.3	7,930
317 (WY)	11.0	7,440
457 (CO)	22.7	8,400
378 (CO)	19.3	9,400
1097 (UT)	14.9	8,684
559 (UT)	11.3	8,724
Average	**15.4**	**8,430**

NOTE: Data obtained from NRCS SNOTEL sites, available at http://www.wcc.nrcs.usda.gov/snow/. Data accessed 1/8/2013.

Peak discharges above the Green River Diversion Dam were estimated using the HEC-SSP program (USACE 2010) for the years 1965 through 2009. This program applies the methods outlined in Bulletin #17B (USGS 1982) to a time series of flow data in order to calculate the discharge for various annual return periods. Results are given in Table 2-3 for the 2-, 25-, 50-, and 100-yr events. Results in the table are similar to results published elsewhere (cf. Gerner et al. 2006).

Peak discharges above the Green River Diversion Dam were also estimated using the StreamStats program (Kenney et al. 2007), which delineates the watershed area above a point, and uses regional regression equations and regional parameter values to calculate the discharge for various annual return periods. These results are also given in Table 2-3. The applicability of the StreamStats program to the Green River is questionable, given that neither the mean basin elevation nor the drainage area falls within the recommended range encompassed by the regression equations. Nevertheless, the results do offer insight into the natural flow rates that might be observed at the diversion dam, were there no regulating structures upstream. From the table, as the return period increases, the estimated natural flow in the Green River grows significantly over the regulated flows calculated with HEC-SSP. This is indicative of the natural hydrology within the basin, compared with the attenuated flows due to water storage in the Flaming Gorge Reservoir.

Table 2-3. Peak Discharges for Various Return Periods, Estimated Using StreamStats and HEC-SSP

	Discharge (cfs)	
Statistic	**StreamStats**	**HEC-SSP**
2-Yr	22,300	21,386
25-Yr	54,400	40,726
50-Yr	62,800	44,603
100-Yr	75,400	48,170

Instantaneous flood frequencies were also calculated for each month using flow data obtained from USGS gaging station 09315000. Results are given in Table 2-4 below. From the table, the hydrograph in the Green River basin appears to have two peaks (bimodal). One peak occurs in the late Fall (October, November) when the area experiences frequent rainfall events, while the other, larger peak occurs in the Spring and Summer (February through July), when snowpack begins to melt. Results also show that the lowest flows occur in August, when 1% of flows will be less than 764 cfs. Alternatively, the largest flows occur in June, when 1% of flows will be greater than 41,530 cfs. Similar information is provided in Table 2-5, but for those months during which boating and fish spawning are common.

Table 2-4. Instantaneous Flood Frequencies by Month for the Green River at USGS Gaging Station 09315000

		% of Flows Less Than					
	Month	**1**	**5**	**10**	**50**	**95**	**99**
Discharge (cfs)	**January**	916	1,312	1,633	2,924	5,189	6,162
	February	1,253	1,648	1,853	3,094	6,058	8,144
	March	2,000	2,243	2,485	4,052	8,361	10,905
	April	2,352	2,719	2,985	5,272	12,585	16,030
	May	3,340	4,055	5,032	11,505	24,903	34,562
	June	1,703	3,038	4,020	13,907	32,475	41,530
	July	907	1,363	1,619	4,205	16,315	32,681
	August	764	1,139	1,327	2,884	6,938	9,983
	September	1,022	1,228	1,395	2,628	5,068	6,743
	October	1,307	1,479	1,703	3,023	7,068	7,976
	November	1,532	1,729	1,866	3,228	6,367	7,087
	December	939	1,260	1,441	2,810	5,824	6,452

Table 2-5. Instantaneous Flood Frequencies for Boating and Spawning Months

		% of Flows Less Than					
	Month	**0.5**	**1**	**2**	**3**	**4**	**90**
Discharge (cfs)	**April**	2,224	2,352	2,507	2,581	2,654	10,380
	May	3,030	3,340	3,604	3,764	3,907	21,468
	June	1,384	1,703	2,275	2,538	2,753	25,688
	July	804	907	1,072	1,202	1,313	12,730
	August	716	764	893	1,018	1,098	5,249

2.1.2 Surface Water Quality

In 2004-2005, USGS conducted an investigation of water quality in the Green River within the reach just upstream of the Green River Diversion Dam down to Green River, UT. The study looked at specific dissolved solids concentrations, which were observed in wide ranges within the reach. Waters diverted for irrigation typically had much lower concentrations, while drainage water from agricultural runoff returning to the river had much higher concentrations (Gerner et al. 2006). Despite the local high concentrations of suspended sediment, no Total Maximum Daily Load (TMDL) rules exist for the reach, neither with respect to suspended sediment nor any other constituent of concern. Furthermore, the reach below the Green River Diversion Dam is not classified as an impaired water body, according to the most recent 303(d) listing for Utah (UDEQ 2012). Finally, a uranium mill tailings disposal site is located approximately 8 miles downstream of the project site. The most recent evaluation of the disposal facility concluded that no constituents of concern (arsenic, nitrate + nitrite, selenium, sulfate, or uranium) had exceeded their respective proposed alternate concentration limits at sampling locations within the Green River (DOE 2012).

Water temperature in the Green River near Green River, UT was periodically recorded between 1952 and 1981. The data, totaling 473 measurements, are plotted in Figure 2.2 against the month in which they were recorded. From the figure, there is a large seasonal variation in water temperature, ranging from just above freezing in the Winter (0 °C), to about 25 °C in the late Summer (77 °F). Also depicted in the figure are the yearly average water temperatures for the period of record. Although there is variation throughout, the

completion of Flaming Gorge Dam in the late 1960s has dampened this variation, leading to a more uniform inter-annual average temperature. Overall, the average annual temperature in the Green River is about 13.9 °C (57.0 °F). Also, the presence of the dam appears to have led to an overall drop in average water temperature, most likely due to the thermal stratification in the reservoir and the initial bottom release of water, despite the fact that water is now released at multiple levels from within the reservoir.

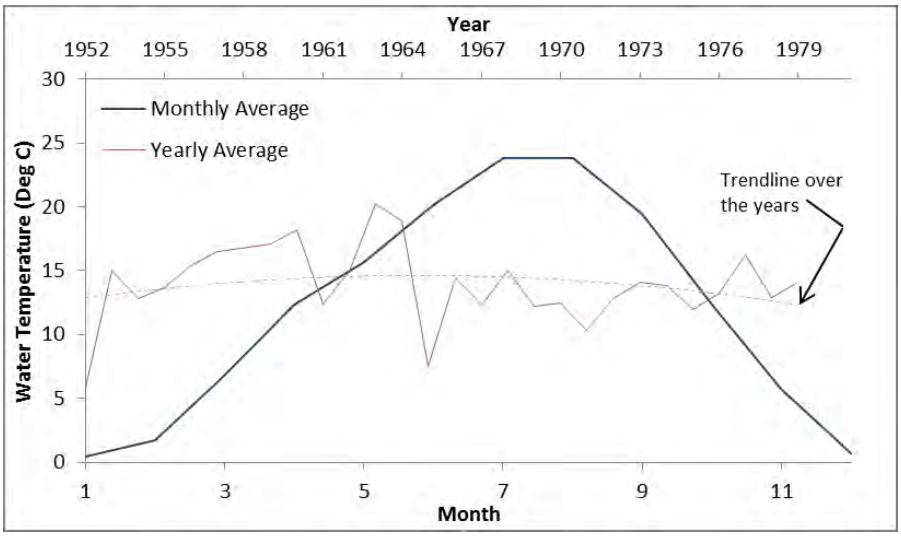

Figure 2-2. Surface Water Temperature in the Green River at Green River, UT by Monthly and Yearly Average

2.1.3 Surface Water Rights

Several water rights exist on the Green River near the project location. Some of these rights are approved, while others have been perfected. A perfected water right is a right that has been both approved and consummated, i.e. the water right has actually been put to beneficial use. A list of the larger perfected water rights near the Green River Diversion Dam is provided in Table 2.6.

Table 2-6. Surface Water Rights on the Green River near the Project Location

Water Right	License No.	Priority Date	CFS	Use
Chris Dunham, Howard Hastings, Clark Ross	92-74	1/1/1879	5	Irrigation
East Side Irrigation Company	92-4	2/8/1906	6	Irrigation
Chris Dunham, Howard Hastings, Clark Ross	92-43	7/29/1912	60	Hydropower Plant
Bruce and Dorothy Nelson	92-21	5/16/1932	2	Irrigation
Lee Thayn	91-113	12375	35	Irrigation
Green River Canal Company	91-294	6/18/1952	60	Irrigation, Stockwater and Domestic
Eastside High Ditch Irrigation Company	92-622	8/7/1958	5	Irrigation
Eastside High Ditch Irrigation Company	92-633	8/7/1958	7	Irrigation
Gunnison Butte Mutual Irrigation Company	91-5075	8/7/1958	4	Irrigation
Gunnison Butte Mutual Irrigation Company	92-638	8/7/1958	11	Irrigation

Water Right	License No.	Priority Date	CFS	Use
Lee Thayn	91-4130	11/25/1974	600	Hydropower Plant
Lee Thayn	91-5161	8/7/1985	4	Irrigation
Green River Canal Company	91-5043	11/3/2000	20	Sluice Canal and Raceway
Total			**819**	

NOTE: Data obtained from Utah Division of Water Rights, available at http://www.waterrights.utah.gov/. Data accessed 1/7/2013.

2.1.4 Sedimentation

Since 1930, the mean annual suspended-sediment load in the Green River near Green River, Utah has been about 15,630,000 tons/year (Thompson 1984). After completion of Flaming Gorge Dam, however, this amount was reduced by about 35%. Also, the annual loads vary greatly from year to year due to the variation in geology and climate throughout the vast watershed. Suspended sediment concentrations are plotted against year in Figure 2-3, which shows concentrations at Green River, UT (9315000), at Jensen, UT roughly 187 mile upstream of the diversion (9261000), and at Green River, WY (9217000) roughly 355 miles upstream of the diversion. Interestingly, the gages below Flaming Gorge Dam have recorded consistently higher average annual suspended sediment concentrations than has the gage upstream of the dam. This is due primarily to the inflow of the Yampa River a little upstream of Jensen, which is a free-flowing river with a relatively high average suspended sediment load. Also from the figure, a clear trend is visible at the gages below Flaming Gorge Dam that indicates a decline in sediment concentration since the dam was completed. However, even the gage upstream of Flaming Gorge Dam shows a decline in suspended sediment concentration, possibly indicating changes in land use, forest practices, or climate.

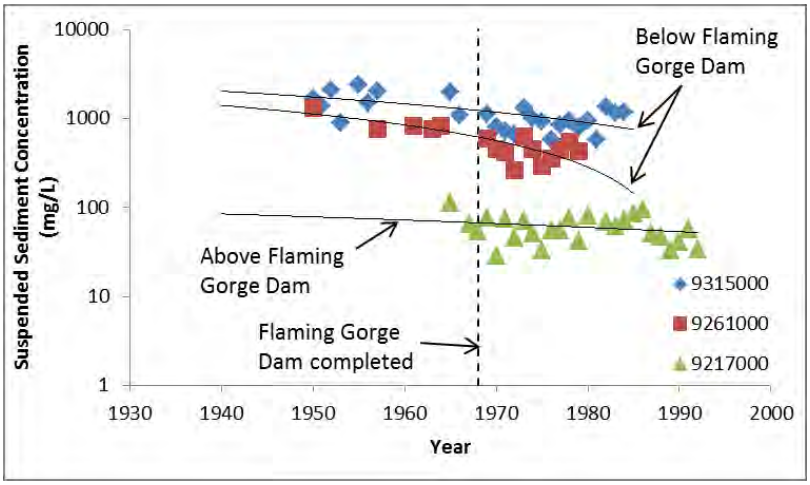

Figure 2-3. Suspended Sediment Concentration versus Year for the Green River near Green River, UT.

Suspended sediment concentrations in the Green River at Green River, UT also show seasonal variation, as indicated in Figure 2-4, which shows data points for average daily sediment concentrations for a 35-year period of record. From the figure, suspended sediment concentration appears to have two peaks throughout the year (bimodal): a smaller peak in the late Winter/early Spring, and a larger peak in the early Fall. Also, suspended sediment concentrations appear to lag behind Green River flows by about 3 to 4 months, due to the fact that the river is not always transporting sediment, but is often depositing in locations.

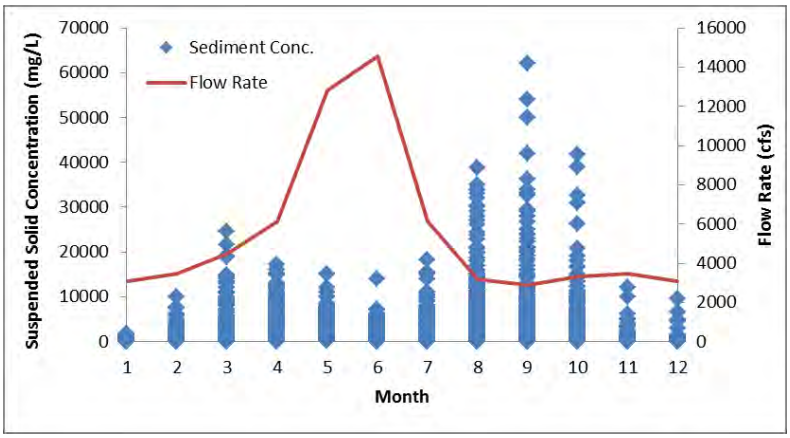

Figure 2-4. Suspended Solid Concentration and Flow Rate versus Month

Downstream of the Green River Diversion Dam, Tusher Wash enters the reach from the east bank as an ephemeral stream. Tusher Wash has introduced a large amount of sediment into the Green River in the form of sediment pulses due to high-intensity thunderstorms and flash flooding typical of semi-arid environments. Due to the high magnitude and turbulent energy of flash floods, bed and bank erosion occurs, contributing sediment to the flood flow. This contribution of sediment is highly noticeable at the junction of Tusher Wash and the Green River, taking the form of a large island bar in the Green River downstream of the diversion structure. Deposition at this location is most likely due to a change in channel slope. The discharge through the downstream reach of Tusher Wash is at a slope of 1.1%, whereas the reach downstream of the junction with the Green River is at a slope of 0.11%. This ten-fold reduction in stream power results in a significant decrease in sediment transport capacity, leading to the area of deposition below the dam.

AEC and RB&G (2010) note that the three irrigation canals fed by the diversion dam carry sediment from the Green River, which can cause operational problems due to losses of storage and conveyance, and mechanical issues at headworks, gates, intakes and turbines. In a study conducted by Gerner et al. (2006), water quality monitors were installed throughout the reach below the Green River Diversion Dam to test for dissolved solids and their constituents. Results indicate that the mean total dissolved solids concentrations in the Thayn, Green River, and East Side Canals are only slightly less than that observed in the Green River itself. Furthermore, the relative composition of these solids is also notably similar.

2.1.5 Design Decisions—Surface Water

Due to the comparatively large variations in flows observed at the Green River Diversion Dam, it is important that the project alternatives satisfy a range of water demands over as broad a range of flows as possible. In particular, project stakeholders have decided that the highest priority for water allocation is that water rights holders maintain the reliable and timely supply of water for agricultural, municipal and hydropower uses. Based on the water rights detailed above, the final concept design should divert approximately 819 cfs for water rights holders at as large a range of flows as possible. From the hydrologic analysis given above, these rights will not be met in full all the time. However, this is a consequence of the flow rates coming into the project area, rather than of the diversion structure itself.

The next highest priority for water allocation was determined to be the safe passage of fish both upstream and downstream of the dam. This requires suitable hydraulic conditions as well as sufficient flow allocation. For example, there should be sufficient flow through the west-side raceway in order to allow fish to bypass downstream irrigation systems. Although the planned e-barrier and fish bypass are not part of this project, the final design of this project would affect the ability of these structures to safely convey fish back into the

river. For this reason, an additional 30 cfs should be allocated for diversion at the widest range of flows possible. Thus, the total amount of water diverted by the structure should be no less than 849 cfs (819 cfs + 30 cfs). Upstream passage of fish will also require water allocation. Any water required for this demand will be added only after the 849 cfs has been met. Finally, downstream passage of fish will also require water allocation. Any water required for this demand will be added only after the 849 cfs and the water demand for upstream passage have been met.

Boater interest in an unobstructed, navigable Green River has been expressed. Thus, as a final priority, boat passage will be introduced into the final concept design and will be operational only after water rights and fish passage requirements have been met.

Project stakeholders have expressed concern that the project design will exacerbate upstream flooding. For this reason, the 100-year discharge (48,170 cfs) will be used in hydraulic simulations of the alternatives in order to ensure that the final concept design does not increase upstream flooding.

Design decisions regarding surface water flow are further investigated in Section 3—Hydraulic Simulations.

2.2 Ground Water

Although the Green River Diversion Dam affects primarily surface water of the Green River, because the river is hydraulically connected to the underlying water table, changes to surface water initiated by the diversion dam will effect changes in the ground water below.

The area surrounding the Green River Diversion Dam, located in the Uinta basin, is underlain by the Dakota-Glen aquifer system, which is itself part of the greater Colorado Plateau system. In the project area, the Dakota and Glen Canyon aquifers are typically 300 feet thick. The Dakota aquifer is less than 2,000 feet below the surface, while depth to the Glen Canyon aquifer is typically greater than 2,000 feet. The Uinta basin is immediately underlain by Mancos Shale, which forms a confining unit, and Dakota Sandstone, followed by the Cedar Mountain Formation.

2.2.1 Ground Water Flow

Water table levels in the area surrounding the Green River Diversion Dam are dictated by vegetative consumption of ground water, deep percolation of irrigation water, baseflow to the river, and consumptive use by people pumping in the area. In a recent study (Gerner et al. 2006), ground water levels in 13 wells in the area ranged from 1.3 to 15.5 feet below the surface, with an average of 7.6 feet. However, ground water levels at each well also varied over the period of several months during which the study was conducted. These temporal variations are due to 1) changing irrigation practices, 2) seepage from the canals, 3) discharge to seeps and drains, 4) evapotranspiration, 5) consumptive use by vegetation, and 6) pumping for stockwater, irrigation, and domestic use.

2.2.2 Ground Water Quality

Ground water at the project location is presumed to be of good quality, due to the fact that there are no sites either in Emery or Grand County found on the National Priorities List (NPL). Nor are there any Corrective Action Superfund Sites nearby. Also, dissolved solids are typically found in concentrations between 1,000 and 3,000 mg/L in the project area. However, there is a uranium mill tailings disposal site approximately 8 miles downstream of the project location. The most recent evaluation of the disposal facility concluded that no constituents of concern (arsenic, nitrate + nitrite, selenium, sulfate, or uranium) had exceeded their respective proposed alternate concentration limits (ACLs) at ground water sampling locations distributed

about the facility (DOE 2012). ACLs are established at levels that do not pose a threat to human health or the environment. However, ground water in the Browns Wash alluvium and middle sandstone unit of the Cedar Mountain Formation beneath the former processing site has been contaminated to some degree by past ore-processing activities.

2.2.3 Ground Water Rights

Several ground water rights exist within a mile or so of the Green River Diversion Dam. These rights are consummated by pumping wells for domestic, irrigation, and stockwater uses. A list of the existing rights within about a mile of the diversion dam is provided in Table 2-6.

Table 2-6. Ground Water Rights on the Green River near the Project Location

Name of Water Right Owner	Flow (cfs)	Flow (ac-ft/yr)	Use
Harold W. Nelson Family Trust		0.45	Domestic
Sam and Mark Wilson		5.73	Irrigation, stockwater and domestic
Sequoiadendron, LLC		0.45	Domestic
T.J. Hastings		0.45	Domestic
Chris Dunham		0.73	Stockwater
Chris Dunham	0.015		Domestic
Tim Vetere		5.73	Irrigation, stockwater and domestic
Wilkey Holdings, LLC		2.77	Irrigation, stockwater and domestic
Steven L. and Katherine Pappas		5.73	Irrigation, stockwater and domestic
Mark W. Williams		6.73	Irrigation and domestic
Mark W. and JoAnn L. Williams		5.73	Irrigation, stockwater and domestic

NOTE: Data obtained from Utah Division of Water Rights, available at http://www.waterrights.utah.gov/. Data accessed 1/11/2013.

2.2.4 Seeps and Springs

The existing diversion dam loses an estimated 10 cfs at low flow through seepage. This is most likely due to the dilapidated state of the structure and the absence of any cutoff walls.

Seepage losses through the Thayn, Green River and East Side canals were estimated by Gerner et al. (2006) for the period between May 2 and October 4. These estimates indicate losses due to seepage of 5 cfs, 15.3 cfs, and 4.7 cfs, respectively.

Seepage is also known to occur upstream of the existing diversion dam along the left (east) bank of the river near Hastings Ranch. A levee exists at that location which, according to anecdotal evidence, has experienced seepage during high flow events. This has impacted agricultural operations in that area during high flows.

2.2.5 Design Decisions—Ground Water

Because of the existing ground water rights in the project area, the final concept design should not measurably affect ground water recharge in the area. Rather, the project design should make every effort to maintain the underlying aquifer in the project area.

The design should incorporate elements to reduce the amount of seepage through the dam. This will ensure that surface water rights are met at low-flow conditions. Example elements that would reduce seepage through the dam include a newly cast concrete face and sheet pile cutoff walls.

Seepage through the upstream, east side levee should be minimized or mitigated. For example, upstream seepage through the levee could be minimized by ensuring that the 100-year water surface elevation is no greater under the proposed conditions than it is under existing conditions.

Every effort should be made to ensure that ground water quality in the project area is not hindered. Because no toxic materials are anticipated as part of the concept design, protection of ground water quality would likely be accomplished through the application of Best Management Practices during construction.

2.3 Geology

This section describes the geologic resource in the project area, and includes a description of the general geologic setting and of bank erosion.

2.3.1 General Geologic Setting

The Green River Diversion Dam is located within the Castle Valley physiographic region, which itself is located within the Colorado Plateau physiographic province. The dam is surrounded to the east by the Book Cliffs and to the west by the San Rafael Swell. The geology of the area is comprised of Quaternary alluvium and colluvium, with areas of older alluvium, and Mancos Shale (Hintze et al. 2000). The Green River floodplain is largely comprised of Quaternary alluvium deposits of sands and gravels, while the Mancos Shale dominates the area immediately surrounding the diversion dam. Due to the geologic history of the area, alkali salts have accumulated in the area, resulting in moderate to high concentrations of dissolved minerals and salts in local groundwater.

Moderate landslide potential does occur upstream and downstream of the diversion dam west of the river in particular areas. However, these are located outside the project area. Furthermore, no evidence of landslides exists in the study area (Alpha Engineering Company 2010).

No evidence of active faults has been observed in the study area (Alpha Engineering Company 2010). Seismic hazards are considered relatively low.

No bedrock outcroppings are known in the area.

2.3.3 Bank Erosion

Runoff from intense summer rainfall events over barren slopes can produce flash floods in the dry washes and canyon bottoms of this region, particularly in areas where soils are derived from highly erodible Mancos Shale. Banks are even more susceptible to erosion do to the force of gravity acting on soil particles resting on slopes. Bank erosion can be minimized through a number of means, including reduction of the erosional force of water (e.g. slowing the water down, or redirecting the water away from tangent to the banks), lessening the bank slopes, and revegetating barren banks.

2.3.5 Design Decisions—Geology

The dam rehabilitation alternatives will incorporate features to minimize bank erosion downstream of the structure. This will include revegetation of disturbed areas, ensuring that the planform shape of the structure

concentrates flow away from the banks (e.g. with an upstream-arcing shape), and providing abutments that dissipate turbulent eddies in the tailwater.

Although no seismic hazards are known in the area, the final design crest height will be low enough not to trigger a moderate or high hazard classification.

Provided that the depth to bedrock is deep enough, sheet pile cutoff walls will be driven. In the case that the depth to bedrock is shallow, however, sheet pile will be anchored to the bedrock

SECTION 3
HYDRAULIC SIMULATIONS

3.0 Introduction

The following section discusses the hydraulics at and around the Green River Diversion Dam, both under existing conditions and under the conditions of the four alternatives investigated for this project. In the case of Alternatives 3 and 4, the hydraulic response of the system to the project is assumed to be the same, so that the descriptions contained herein apply to both equally.

This section outlines the model approach adopted to analyze the hydraulics at and around the dam, and discusses several areas of concern, including:

- upstream flooding
- structural stability
- sediment sluicing
- upstream fish passage

3.1 Modeling Approach

The following section describes the modeling approach undertaken to simulate the hydraulic response of the system under both existing and design conditions. Specifically, the section discusses the choice of the model, and the efforts undertaken to simulate both existing conditions, and conditions representative of the four alternatives under investigation. The section also discusses the use of the model as a design tool in order to meet the priorities of the project in order of importance.

3.1.1 Model Choice

Due to the arc-like shape of the diversion dam, and the flow split between the raceway and the main channel of the Green River, the hydraulics at and around the diversion dam lends itself to a 2-dimensional analysis. For this reason, the 2-dimensional finite element hydrodynamic model RiverFLO-2D was chosen to simulate various flow scenarios passing through the existing structure and through the various alternatives.

3.1.2 Modeling Existing Conditions

Existing conditions at the diversion dam were simulated by integrating LiDAR data provided by NRCS with survey data collected in 2013. Although the existing diversion dam crest is not constant, and generally slopes downward from west to east, as a conservative approach the crest elevation was set to the minimum elevation of the dam (4086'), because setting mesh elements to the same elevation is much more economical and, at higher flows, produces the same results. For lower flows, the backwater would transition to nonuniform flow at a slightly higher elevation. However, this discrepancy was considered acceptable.

The raceway to the Green River Canal and Thayn Hydropower was only included from the flow split to the existing "8 gate" structure. At low flows, a sink was inserted near the "8 gate" structure in order to simulate the demand along the west side of the river. Similarly, a sink was inserted near the siphon inlet to the east side canal and water wheel raceway in order to simulate the demand on the east side. At high flows, these sinks made model convergence difficult. They were therefore taken out, with the rationale that at high flows these small sinks would have a negligible impact on upstream flooding and sediment transport.

Boundary conditions for the model included an inflow boundary several channel widths upstream of the existing dam in order to allow the program to achieve quasi-uniform flow conditions by the time water reached the dam. A variety of inflow conditions were investigated, including both steady-state inflows and an unsteady hydrograph with a peak equal to the 100-year flood (see Section 2.1.1 for flow exceedances). The downstream boundary condition was set to the slope of the energy grade line under uniform flow conditions, which was approximated by using the bed slope of 0.12%. This slope value was calculated by performing a linear regression of bed elevation onto stationing along the channel centerline using the supplied LiDAR data. The downstream boundary was established near the tailwater of the hydropower facility.

3.1.3 Modeling the Alternatives

The alternatives were modeled by using the CAD surfaces of each alternative as the model topography. Breaklines were introduced along the dam crest and elements representing the sluice gates, downstream fish notches, upstream fish passageway and boat ramp were modified manually. For the investigations of potential upstream flooding and sediment sluicing the sluice gates were considered open, and set to an elevation of 4082 feet. As mentioned, Alternatives 3 and 4 were simulated with the same model, due to the fact that the resolution of the model was not capable of discerning the differences between these two designs.

3.1.3.1 Boundary Conditions

Each of the four alternatives considered includes a radial gate structure across the hydropower raceway that is in the same location, i.e. upstream of the existing "8-gate" structure. For this reason, the domain boundary in the raceway was moved upstream for all four alternatives. The topography at the proposed gate location was modified in order to constrict the channel, and thereby better represent the gate abutments connecting to the banks of the raceway, as well as to reflect the piers separating each of the gates. Also, for low flows a single sink was placed in the middle of the raceway at this location and assigned a value of 773 cfs in order to represent the water demand passing through the gates. The assumption here was that the gates will be manually or automatically operated in such a way that 773 cfs passes through the raceway, but no more and no less. Although the resulting water surface just upstream of the radial gate will be slightly different than that produced by the model, this was deemed acceptable for two reasons: 1) the difference between actual water surface elevations and model results is expected to be small at this location; 2) this is a local phenomenon, and should have a negligible effect on water surface elevations further upstream at the dam crest and elsewhere.

The model was run beginning with the low-flow condition of 849 cfs and was gradually assigned higher and higher inflows until the total flow rate equaled the 100-year flow (48,170 cfs). After each incremental addition of flow, the model was allowed to run at a steady inflow in order to achieve steady state conditions. This ensured that the tailwater rating curve was as accurate as possible. The downstream boundary condition was assigned the slope at normal flow (0.0012), and was calculated as above (see Section 3.1.2).

3.1.3.2 Determining Invert Elevations

The RiverFLO-2D model was used as a design tool to determine the invert elevation of the dam notches that would be first activated after the water rights and fish bypass requirements were met. Water rights in the area demand 819 cfs total, while a conservative estimate of the water demands for the fish bypass is 30 cfs. To find this invert elevation, the crest of the dam was set arbitrarily high in order to force the 849 cfs inflow (819 + 30 = 849 cfs) to be routed through the east-side canal (96 cfs) and the raceway (753 cfs). Boundary conditions were established upstream of the dam several hundred feet and in the raceway upstream of the existing "8 gate" structure. It was assumed that uniform flow conditions were met in the

canal, such that a bed slope boundary condition could be established in the raceway. The east-side canal diversion was represented by a single "sink" with an associated demand of 96 cfs. The inflow boundary condition was simply the 849 cfs discharge through the reach. See Section 2.1.3 for a discussion of surface water rights.

Results of the design model indicated a maximum water surface elevation (WSE) adjacent to the crest of the dam of 4087 ft. This is close to what was expected for this condition. Velocity vectors, water depths, mass balance, and the raceway boundary condition were verified using engineering judgment. Therefore, as a first pass, the invert elevation of the dam notch activated first was set to 4087 ft. This would ensure that, at a flow of 849 cfs, all water would be allocated to the raceway and the east-side canal in order to meet the water rights in the area, which have been assigned the highest priority for the project. Furthermore, the second highest priority of fish bypass through the canal would be met at this flow rate, in order to minimize the possibility of fish injury or mortality once the water rights have been met.

The third highest priority for water allocation is upstream fish passage. Specifically, passage of the following four endangered fish species is of interest: Humpback Chub, Bonytail, Razorback Sucker, and Colorado Pikeminnow. Flow depths for upstream passage of these fish are based on the largest of the four, the Colorado Pikeminnow, for which it has been suggested that 1 foot of water depth be allocated for safe passage (USBR 2005). Pertinent information regarding these fish species is given in Table 3-1. Assuming a trapezoidal fishway with channel width of 10 feet, a 40:1 channel slope (2.5%), and a Manning's roughness coefficient of 0.07, the water allocation required to allow upstream fish passage would be 30 cfs. The invert of the fish passage channel would thus begin at 4087 ft, and the next highest priority water allocation notch would be triggered at 4088 ft.

Table 3-1. Pertinent Information for Sensitive Fish in the Green River

Common Name	Scientific Name	Spawning Period	Required Water Velocity (fps)	Required Water Depth (ft)
Humpback Chub	Gila cypha	April through July	4	1
Bonytail	Gila elegans	June through early July	4	1
Razorback Sucker	Xyrachen texanus	mid-April to mid-June	4	1
Colorado Pikeminnow	Ptychocheilus lucius	July to September	4	1

The fourth highest priority for water allocation is downstream fish passage, again for the four species mentioned above. Constraints for downstream passage are generally less strict. For instance, velocities can be higher and depths can be shallower. For downstream passage, weir flow over the crest of the dam is assumed, and the minimum depth of flow is set to 0.6 ft. Assuming a weir coefficient of 2.67 over the crest, the required flow rate for three 10-foot wide notches spread out across the dam is 40 cfs. The invert of the downstream fish passage notches would thus begin at 4088 ft. However, in order to provide deeper passage through the dam and thereby increase the possibility of passing fish downstream, the crest of the downstream notches is set to 4087. The notches are controlled by stop-logs, however, in order to ensure that water rights and upstream passage are achieved at low flows.

The final water allocation priority is given to downstream boat passage. Depending on whether the length of the passageway is 20 ft or 80 ft, the required flow ranges from 147 cfs to 295 cfs. Assuming that the boat passageway only requires 1 foot of depth for safe passage, and that the ramp can be as long as 80 feet, the allocation required is only 147 cfs. Thus, at flow rates over 1,066 cfs (849 + 30 + 40 + 147), all water priorities for this project are met. Under this scenario, the boat ramp crest would sit at elevation 4088.6.

However, this would require that the crest of the dam sit at elevation 4089.6, which is 2.6 feet higher than the existing dam crest. Because of the potential for upstream flooding associated with this dam crest height, this scenario was deemed unacceptable.

If, on the other hand, boat passage were provided as a rock-lined channel over the dam which is first wetted when the crest of the dam is wetted (i.e. the invert of the boat passageway sits at the same elevation as the crest of the dam), then the dam crest elevation could be at elevation 4088 ft. In the case that one foot of water is required to safely pass boaters, and assuming a weir coefficient of 3.1 over the dam, and a dam crest length of 755 feet, the required flow over the dam would be 2,341 cfs. Adding this to the higher priority water allocations gives a total required flow rate of 3,210 cfs in order to pass boaters. Referring to the monthly flood frequencies given in Section 2.1.1, these flows are exceeded about 90% of the time between May and June. In July, this flow is exceeded over 50% of the time, and in August and September it is exceeded between 5% and 50% of the time. Therefore, setting the invert of the boat passage ramp at 4087' would allow boaters to pass reliably in the late Spring and early Summer, and on an intermittent basis during the mid- to late-Summer months.

3.2 Model Results

The following section provides results of the model related to upstream flooding, the structural stability of the dam, and sediment sluicing.

3.2.1 Upstream Flooding

Water surface elevations upstream of the diversion dam were compared between existing conditions and the four alternatives investigated in this report. These comparisons were conducted in order to evaluate the potential flooding impact the rehabilitation might have on agricultural operations in the project area. Figure 3-1, Figure 3-2, and Figure 3-3 provide visual comparisons of water depth during the 100-year event between the four alternatives and existing conditions. The figures also depict the sections shown in Figure 3-4 through Figure 3-7. These latter figures depict the differences between the 100-year depths associated with existing conditions and the 100-year depths associated with the four alternatives. Note that negative values indicate alternative depths that are greater than existing condition depths and that the sections are taken looking upstream. From Figures 3-1 through 3-3, there is no obvious difference between existing conditions and the alternatives downstream of the dam. Upstream, however, there are differences, but they are slight. Figures 3-4 through 3-7 offer a better look at these differences. The important areas of note in these figures are near the banks (the extreme ends of Figure 3-5 through Figure 3-7), where flooding and/or seepage through levees would occur. From the figures, each alternative does a reasonably good job of minimizing the differences in depth at the banks against existing conditions. It should be noted that at the banks, Alternative 1 is generally the best alternative because, for each of the three cross sections shown (Figure 3-5 through Figure 3-7), the difference in water depth between existing conditions and Alternative 1 is very nearly zero. The one possible exception is with Section 4 (Figure 3-7), which shows a depth greater than 1 foot along the right bank. However, this is due to the fact that the location of Section 4 is taken very close to the existing dam, such that uniform flow conditions are no longer applicable, but rather the water surface is gradually varying. Model results therefore indicate that Alternative 1 is preferable over the other three alternatives in terms of upstream flooding. However, the differences between the alternatives are considered so minor, that the extent of upstream flooding does not serve as a deciding factor in determining the Proposed Alternative.

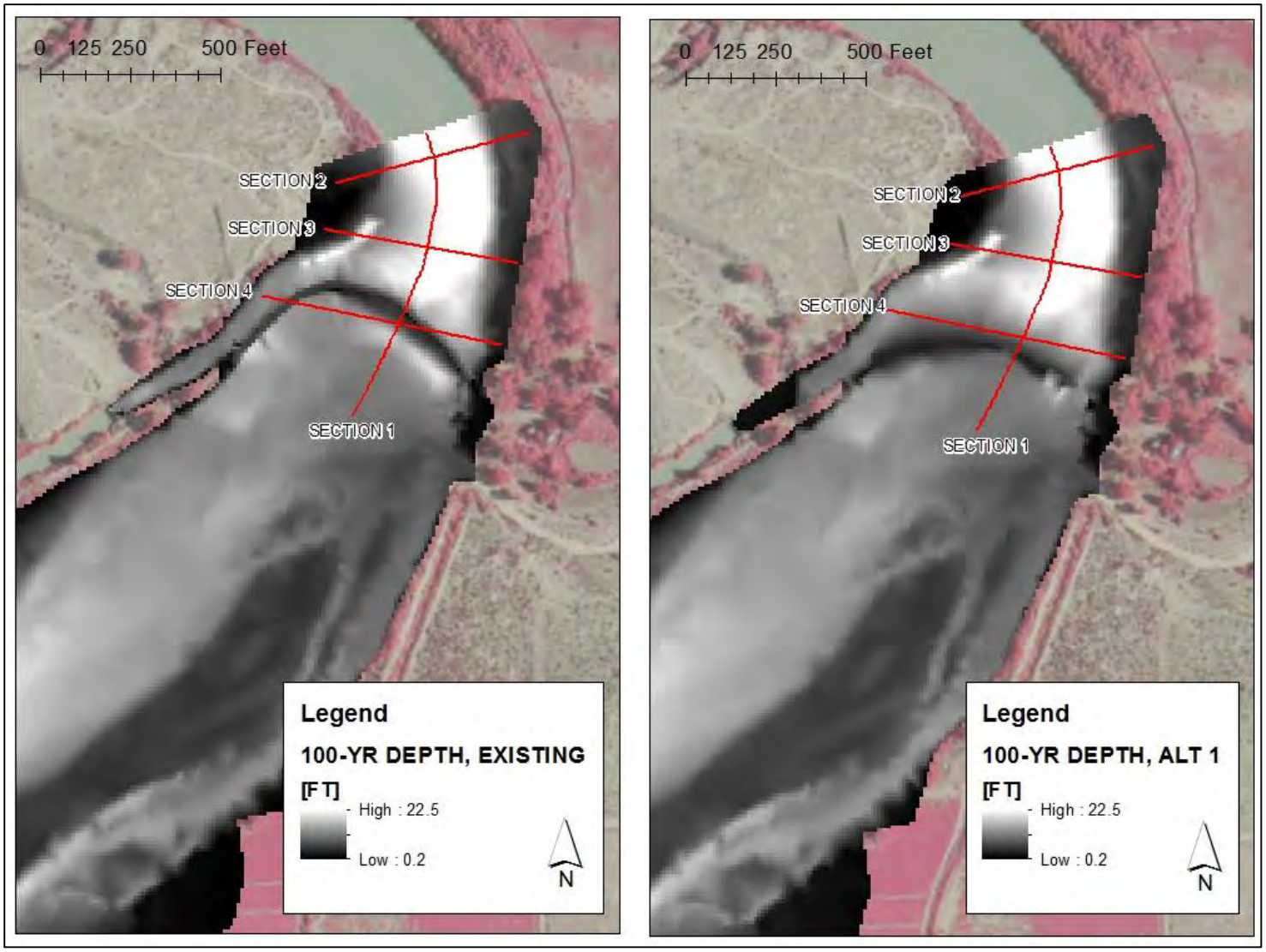

Figure 3-1. 100-Year Water Depth, Alternative 1 and Existing Conditions

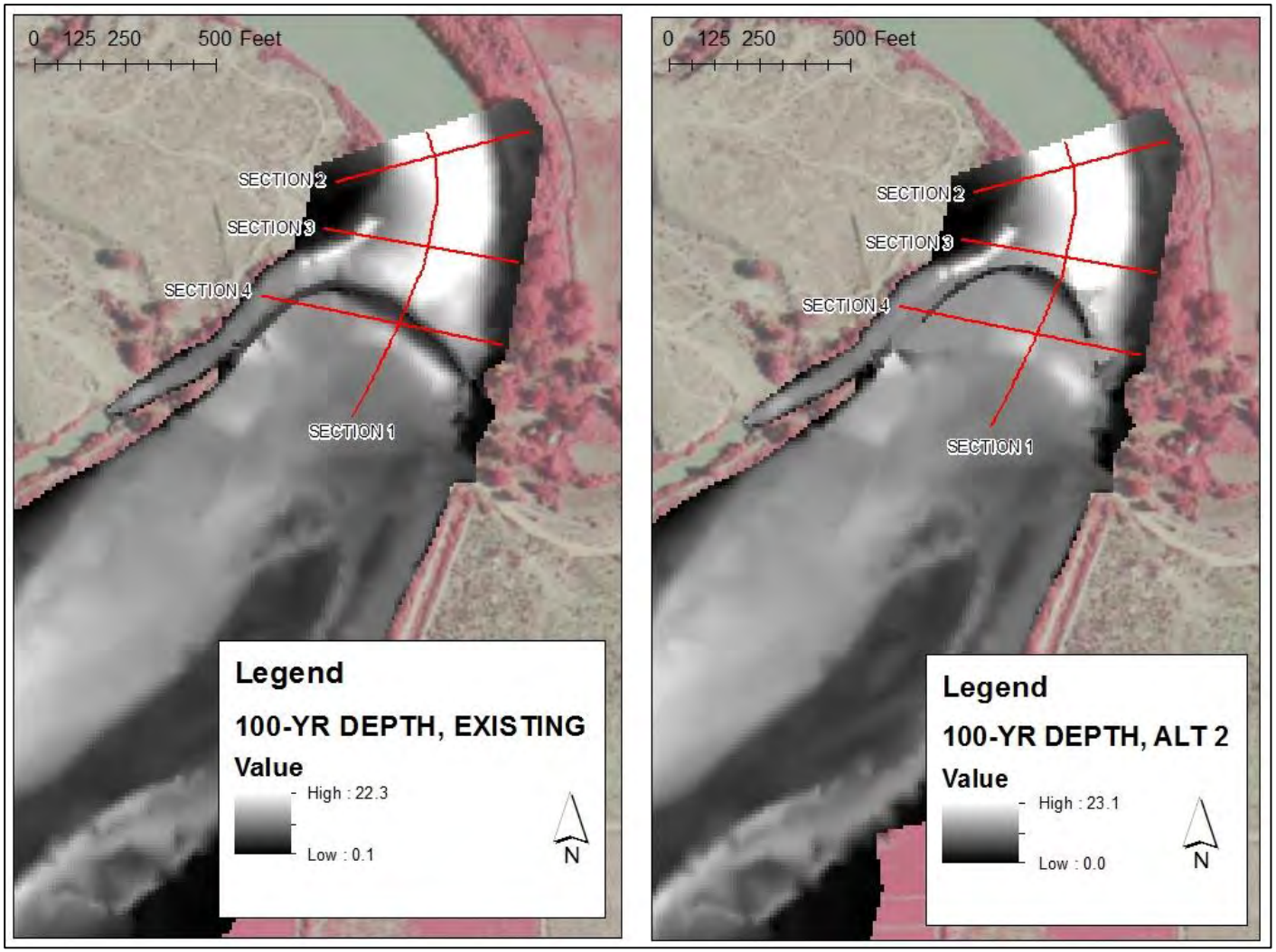

Figure 3-2. 100-Year Water Depth, Alternative 2 and Existing Conditions

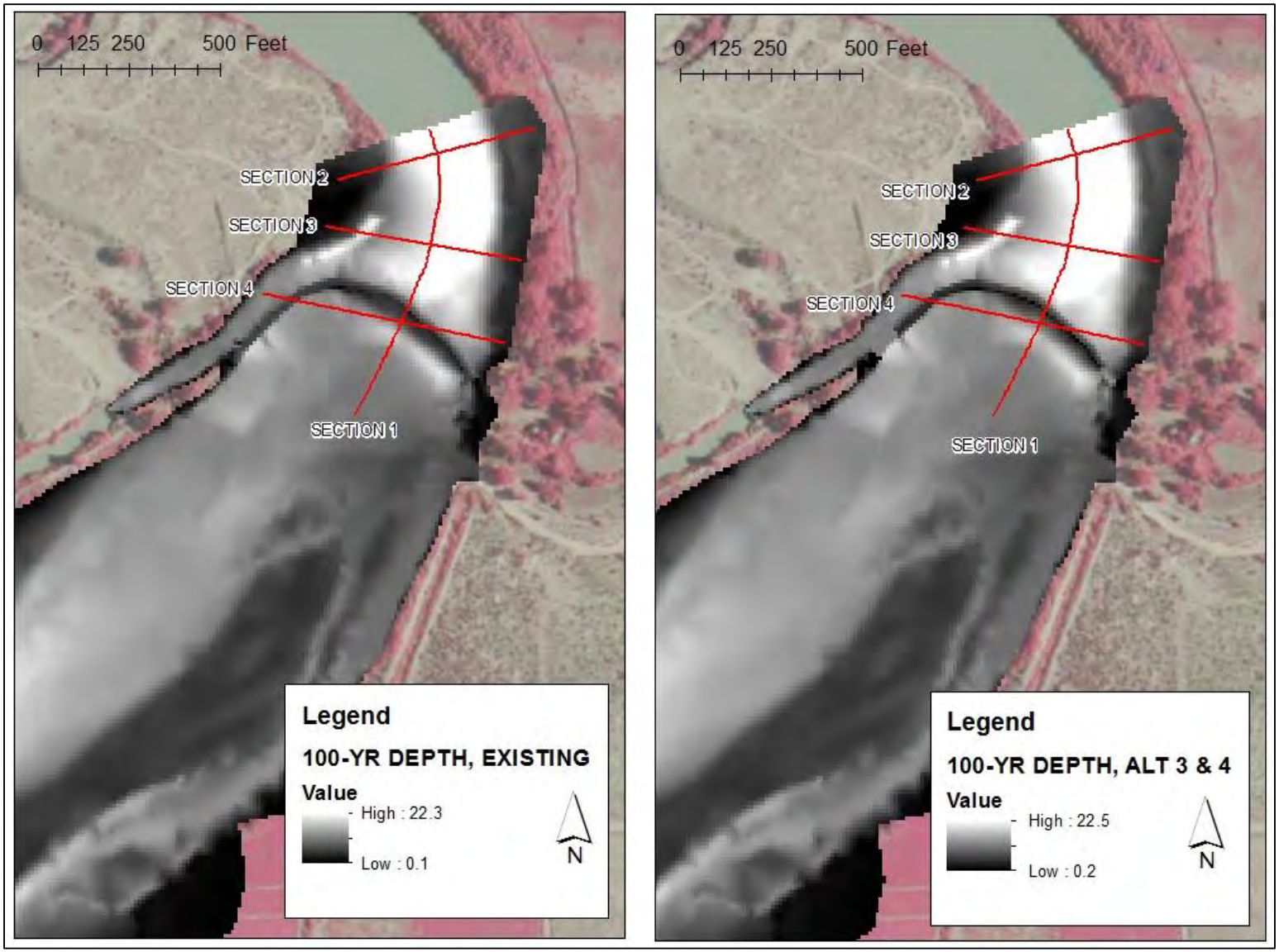

Figure 3-3. 100-Year Water Depth, Alternatives 3 and 4 and Existing Conditions

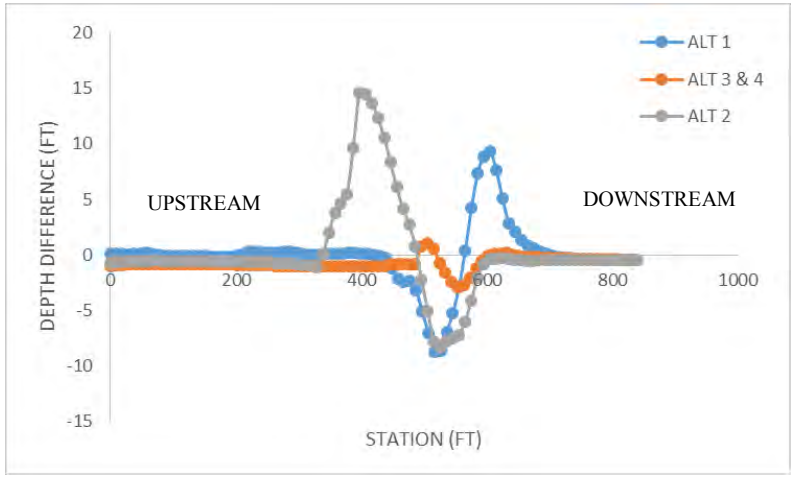

Figure 3-4. Existing Depth Minus Alternative Depths, Section 1, 100-Year Flow

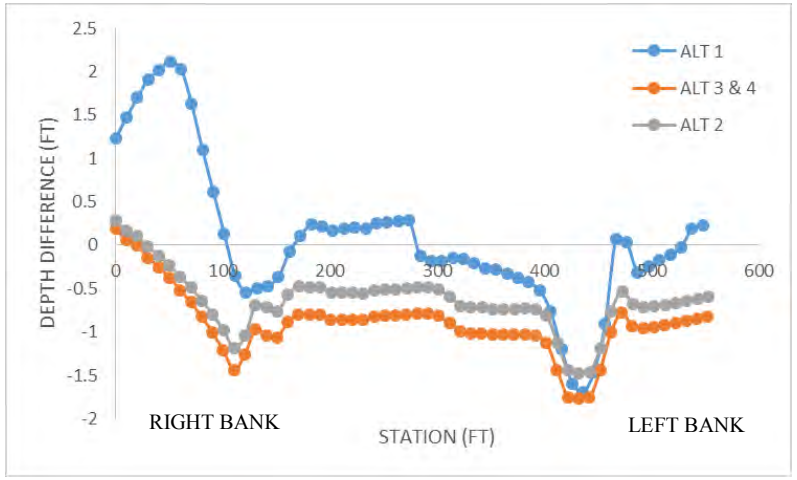

Figure 3-5. Existing Depth Minus Alternative Depths, Section 2, 100-Year Flow

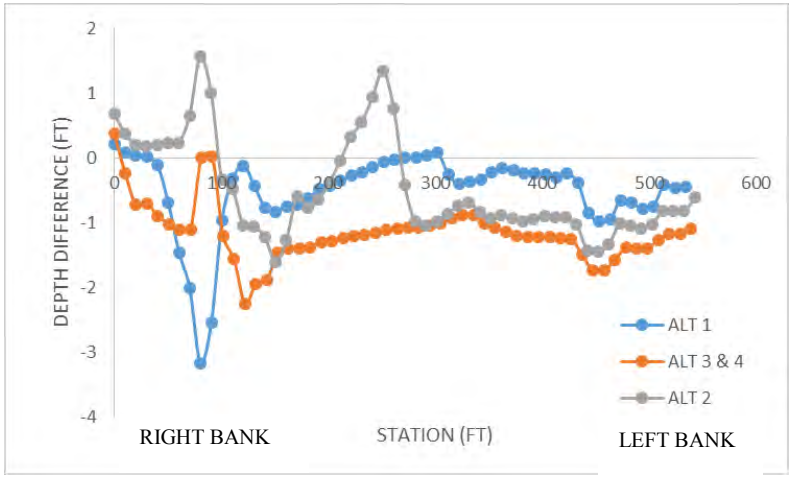

Figure 3-6. Existing Depth Minus Alternative Depths, Section 3, 100-Year Flow

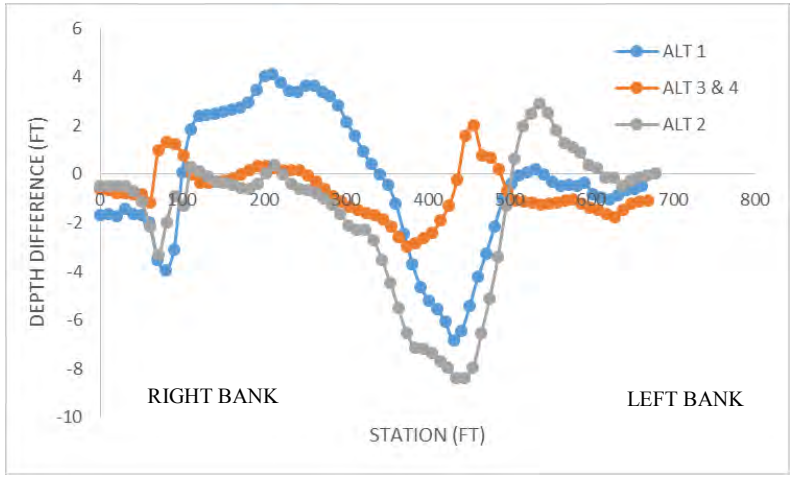

Figure 3-7. Existing Depth Minus Alternative Depths, Section 4, 100-Year Flow

Note: Negative values indicate that the alternative depths are greater than the existing condition depths.

3.2.2 Structural Stability

The cross-sectional design of the dam is the same for Alternatives 1 through 3, and consists of two large sheet pile cutoff walls embedded upstream and downstream of a concrete cap. The cap is secured to the top of the walls and slopes downward at an approximate slope 4:1. The interior of the dam cross section is filled with structural fill material, which itself rests on a compacted bed. For Alternative 4, the cross-sectional design consists of a concrete cap surrounding the existing dam structure, with an upstream sheet pile cutoff wall adjacent to the new concrete cap wall, and another cutoff wall at the downstream end of a concrete slab that extends out from the downstream cap wall.

The stability of the diversion dam is secured by ensuring that the reaction force in the longitudinal direction is greater than the sliding force acting upon the dam, with a factor of safety (i.e. $R_D \geq 1.5F_S$). The calculations for this stability analysis are provided in the following section. For the alternatives considered for this project, buoyancy is not a factor because the water displaced by the volume of the structure is displaced by material denser than water.

The sliding force acting on the dam is given by the following equation:

$$F_S = \frac{\gamma_A H_U^2}{2} \qquad (1)$$

where F_S = is the sliding force (lb/ft)
H_U = upstream height of the soil/water column above the base of the dam (ft)
γ_A = specific weight of the active, moist soil upstream of the dam = approximately 35 lb/ft^3

Similarly, the reaction force in the longitudinal directional is given by:

$$R_D = \frac{\gamma_P H_D^2}{2} \qquad (2)$$

where R_D = is the reaction force (lb/ft)
H_D = downstream height of the soil/water column above the base of the dam (ft)
γ_P = specific weight of the passive, moist soil downstream of the dam = approximately 200 lb/ft3

With H_U equal to approximately 6 feet, and H_D equal to 13 feet, $R_D \geq 1.5F_S = 2.7F_S$. Therefore, no sliding will occur.

3.2.3 Sediment Sluicing

In order to test the efficacy of the radial gate sluicing structures, the model was run at a steady-state inflow of 5,537 cfs, which is the average daily flow rate based on a period of record dating back to the completion of Flaming Gorge Dam. This flow rate was tested in order to determine whether the alternatives could adequately sluice sediment at the average daily discharge. Due to the very minor differences in depth across the four alternatives, shear stress calculations were made only for Alternative 1, under the assumption that bed shears are a linear function of water depth. Additionally, due to the plan-form symmetry of the alternatives, only the east-side radial gates were investigated.

Results for the sediment sluicing simulation are provided in Figure 3-8 below. The figure was created by taking sections parallel with the dam crest successively further away from the crest (i.e. further away from the radial gate). Thus, sections that are close to the crest should indicate higher shear stresses because water

is accelerating through the gate. Sections taken further away from the crest, on the other hand, should indicate lower shear stresses. From the figure, this is exactly the trend depicted.

Figure 3-9 shows the conversion of bed shear stress to the D_{50} particle size that would just be in motion at the average daily flow rate. This conversion was performed according to the following equation:

$$D_{50} = C\frac{\tau_0}{1.25\tau_c^*(\gamma_s-\gamma)} \qquad (3)$$

where D_{50} = median particle diameter in motion (in)
C = conversion constant = 12 (in/ft)
τ_0 = bed shear stress (psf)
τ_c^* = dimensionless critical shear stress = 0.047
γ_s = specific weight of sediment = 165.4 lbf/ft^3
γ = specific weight of water = 62.4 lbf/ft^3

Figure 3-9 indicates that particles between 5 and 7 inches in diameter will pass through the radial gates at the gate structure. This corresponds to large-sized cobbles on the Wentworth scale. Particles with approximately a one-inch diameter will move through the structure from 40 feet away. This corresponds to medium-sized pebbles on the Wentworth scale. Most of the fine material deposited upstream of the existing structure and in the raceway is classified as silt and sand. The shear stresses needed to move these size classes are significantly smaller than those provided by the gate structures at the average daily flow.

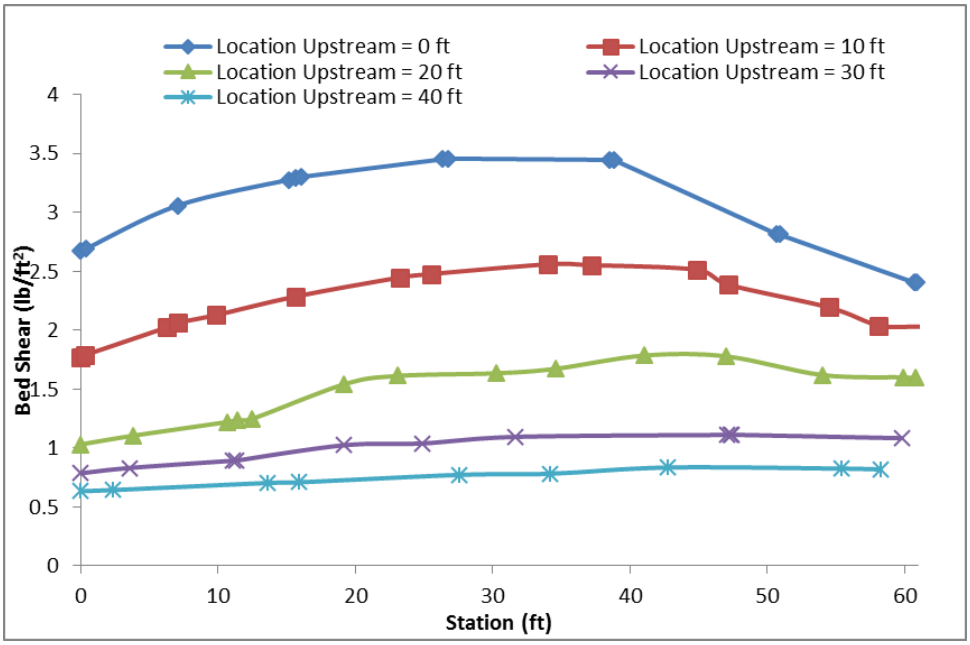

Figure 3-8. Bed Shear Stress for Alternative 1 as a Function of Distance Away from the Radial Gates

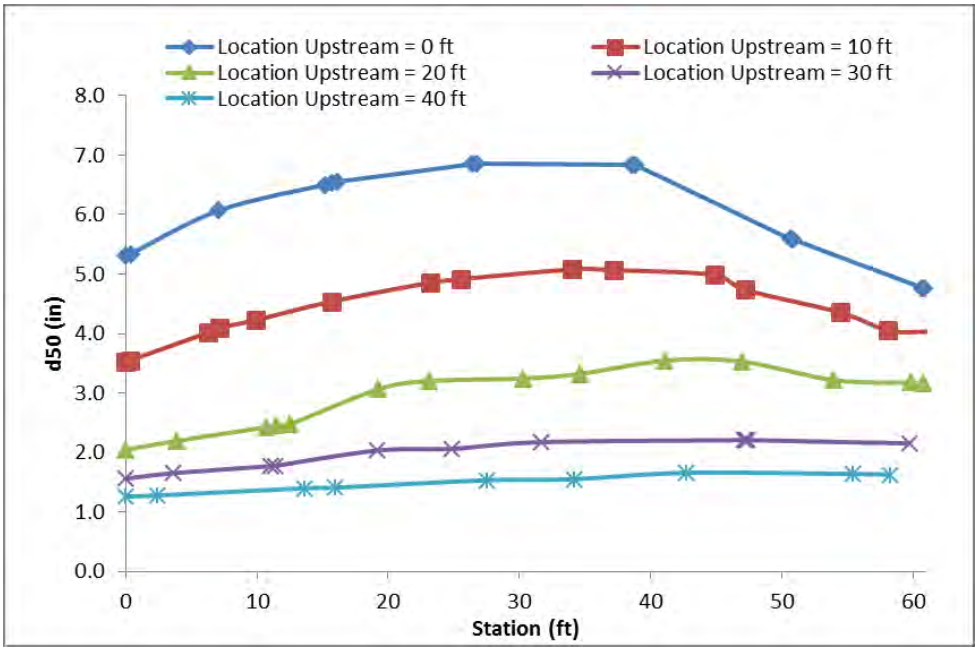

Figure 3-9. D_{50} 0f Mobile Particles for Alternative 1 as a Function of Distance Away from the Radial Gates

3.2.4 Upstream Fish Passage

RiverFLO2D model results indicate that the average daily flow rate of 5,537 cfs will result in a water surface elevation of approximately 4089.7' at the exit to the upstream fish passageway (at the dam crest). According to a HEC-RAS modeled developed in order to analyze fish passage, the maximum velocity in the fishway associated with this head is 4.0 fps. Therefore, fish passage through the fishway is operational at or below the average daily flow rate. The spawning months for fish species of concern span from April through August. Referring to the exceedance flows by month presented in Table 2-4, the average daily flow rate corresponds approximately to the 52% flow in April, the 13% flow in May, the 16% flow in June, the 55% flow in July, and the 79% flow in August. However, due to the difficulty in modeling boulder refuge structures, these estimates are likely conservative, and do not fully reflect the complex hydraulics in the fishway. Thus, it is probably safe to assume that fish will be able to pass the diversion structure on their way upstream at flow rates higher than the average daily discharge of 5,537 cfs.

Figure 3-10 below depicts the resultant velocities in the river within the project area during the average daily discharge (5,537 cfs). The figure only shows locations where velocities are less than 4 fps, i.e. only areas that are passable to fish are depicted. From the figure, it is clear that two routes exist to the entrance to the fishway: one is in the main stem of the river, off to the east side, while the other is in the east-bank side channel. It should be noted that, in order to keeps these routes viable, maintenance of the Tusher Wash depositional area may be periodically necessary. Also, although the route on the west side of the river does not appear viable because it does not connect to the fishway entrance without being interrupted by high velocity flows coming over the dam, this may not be the case in reality. The 2D model does not represent the riprap apron and energy dissipation in the tailwater of the dam. Therefore, it is possible that in practice the west side of the river offers a viable route for migrating fish.

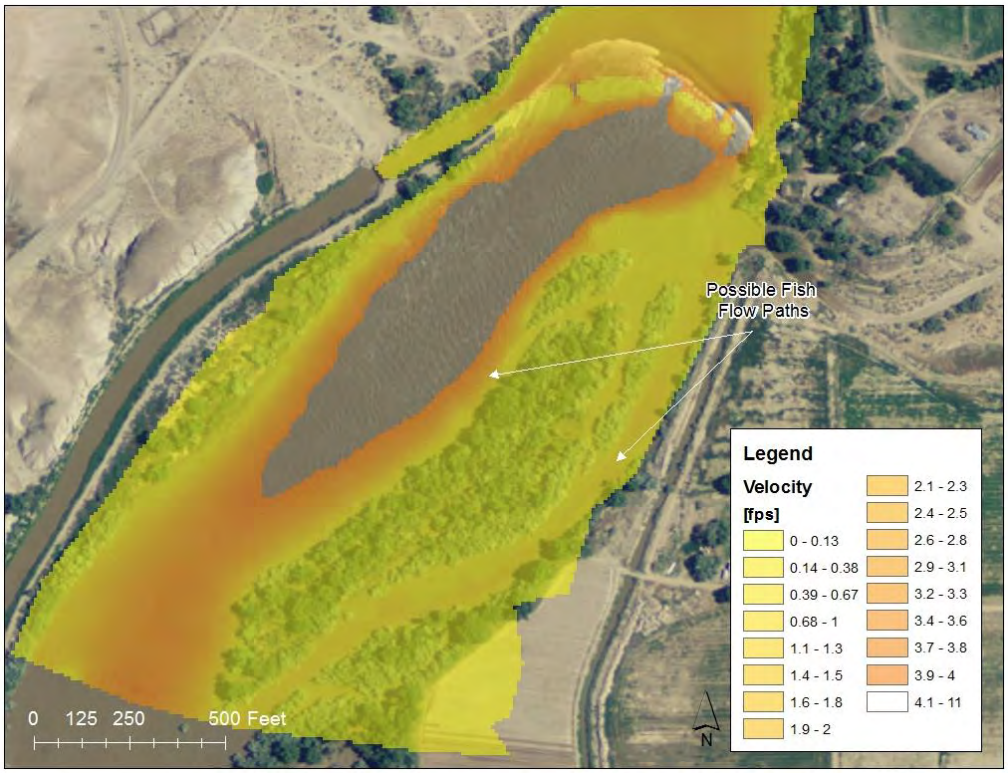

Figure 3-10. Velocity Results for the Average Daily Flow through the Green River

SECTION 4
ECONOMIC EVALUATION

4.0 Introduction

The following section discusses the economic analysis conducted in order to compare the costs and benefits associated with the four alternatives under investigation. Although an effort has been made to be thorough, and to include all conceivable project costs and benefits, some costs and benefits may have been left out of the analysis.

4.1 Methods

A cost-benefit analysis of the various alternatives incorporates the capital costs, operation and maintenance (O&M) costs, and costs and benefits associated with resources affected by the project. Because all four alternatives under investigation provide the same quality and quantity of water to stakeholders in the area, socioeconomic benefits of the alternatives have been left out of the analysis. Also, due to the similarity in the designs, O&M costs are considered to be the same for all four alternatives. Therefore, O&M costs have been left out of the analysis as well. Also, project components that have costs that are the same across all four alternatives have been left out of the analysis. Finally, although monetary costs and benefits associated with other environmental resources in the project area exist (e.g. cultural resources), assigning values to them has been left out of this analysis. Therefore, this economic analysis is restricted to the capital costs (construction, materials, labor, etc.) associated with each alternative. It should be noted that the construction means and methods represented here, and depicted in the design drawings, are conceptual in nature, and do not necessarily represent the construction means and methods selected by the engineer and/or construction contractor during final design. The cost-benefit analysis presented below is therefore an estimate based on concept-level design only, and may change during final design.

4.2 Results

Table 5-1 presents the results of the economic analysis. From the table, Alternative 1 has the lowest associated cost among the four alternatives. However, Alternative 3 is within 1% of the total project cost of Alternative 1, which is considered within the margin of error of the cost-benefit analysis (±30%). Again, the cost represented here is not a total project cost, but is rather the relative cost of each alternative as compared with the others.

Table 5-1. Engineer's Cost Estimate

Component	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cofferdam Phase I	$93,196	$105,514	$104,774	$107,354
Cofferdam Phase II	$69,089	$82,556	$62,240	$63,840
Diversion Structure Phase I	$1,084,615	$1,278,219	$1,097,221	$1,266,088
Diversion Structure Phase II	$1,077,247	$1,278,219	$1,097,221	$1,266,088
Riprap Phase I	$186,437	$219,034	$183,271	$182,279
Riprap Phase II	$186,437	$219,034	$183,271	$182,279
Demolish Existing Structure	$242,037	$241,979	$241,979	$0
Deflection Log Boom	$14,230	$14,227	$14,232	$14,229
Diversion Dam Excavation Extension	$8,808	$8,806	$6,754	$6,752
PIT Tag Dectors	$356,500	$356,500	$356,515	$475,231
Subtotal	**$3,318,597**	**$3,804,087**	**$3,347,479**	**$3,564,139**
General Conditions (15% of Total Cost)	$497,790	$570,613	$502,122	$534,621
Mobilization (8% of Total Cost)	$265,488	$304,327	$267,798	$285,131
Total	**$4,081,875**	**$4,679,027**	**$4,117,399**	**$4,383,891**

SECTION 5
PROPOSED ALTERNATIVE

5.0 Introduction

The Proposed Alternative for the Green River Diversion Dam Rehabilitation Project is to replace the existing dam at its current location (Alternative 3). This design will be cost-effective and provide all of the functionality of the other alternatives. In addition, this alternative would preserve much of the cultural and historical value of the existing structure by maintaining the location and orientation of the structure. The new dam will have the same length as the existing dam, but will be approximately 1 foot higher along the crest and will be designed to greatly reduce seepage below and around the diversion dam. Additionally, the Proposed Alternative will include fish, boat, and debris passage structures, sediment sluicing gates, a radial gate manifold to the raceway, a new raceway to the water wheel, an east-side canal fish and sediment bypass structure, and downstream fish passage notches outfitted with PIT tag detectors.

5.1 Cost Estimate

The engineer's cost estimate for materials, quantities, and labor required to complete the construction for the project is presented in Table 5-1. This estimate includes construction management, labor, materials, equipment, and incidental items necessary to complete the work per the Contract Drawings. The costs presented in the table are based on NRCS selecting a third party construction company for the project. It should be noted that the construction means and methods represented here, and depicted in the design drawings, are conceptual in nature, and do not necessarily represent the construction means and methods selected by the engineer and/or construction contractor during final design. The cost estimate presented below is therefore an estimate based on concept-level design only, and may change during final design.

Table 5-1. Cost Estimate for the Proposed Alternative (Alternative 3)

	Component	Cost
Diversion Dam	Cofferdam Phase I	$104,774
	Cofferdam Phase II	$69,240
	Diversion Structure Phase I	$1,097,221
	Diversion Structure Phase II	$1,097,221
	Riprap Phase I	$183,271
	Riprap Phase II	$183,271
	Demolish Existing Structure	$241,979
	Deflection Log Boom	$14,232
	Diversion Dam Excavation Extension	$6,754
	PIT Tag Detectors	$356,515
Raceway Gate	Earth Dam	$2,859
	Raceway Structure	$266,158
	Raceway Gates	$1,482,087
Sluice Structure	Sluice Structure	$304,037
Fish Passageway	Fish Passage Structure	$239,368
	4 Radial Gates	$2,379,026
	Retaining Wall	$96,587
	Riprap	$140,125
Boat Passage Structure	Boat Passage Structure	$374,046
	Subtotal	**$8,638,771**
	General Conditions (15% of Total Cost)	$1,295,816
	Mobilization (8% of Total Cost)	$691,102
	Total	**$10,625,689**

SECTION 6
CONCLUSION

6.0 Conclusion

The Proposed Alternative for the Green River Diversion Dam Rehabilitation Project is Alternative 3, which consists of a new dam structure at the current location of the existing dam with the same crest length as the original. Other components of the project include gate structures, a fish passageway, a boat ramp, and features to route sediment and debris past the dam. The Proposed Alternative has an estimated cost of $10,625,689.

SECTION 7
REFERENCES

7.0 References

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APPENDIX A

CONCEPT DESIGN DRAWINGS

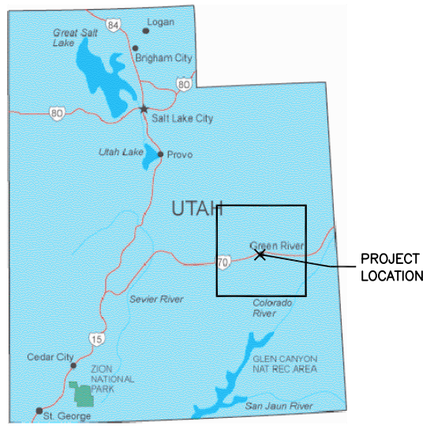
McMILLEN, LLC

NRCS - UTAH
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
SPONSOR - UTAH DEPARTMENT OF
AGRICULTURE AND FOOD

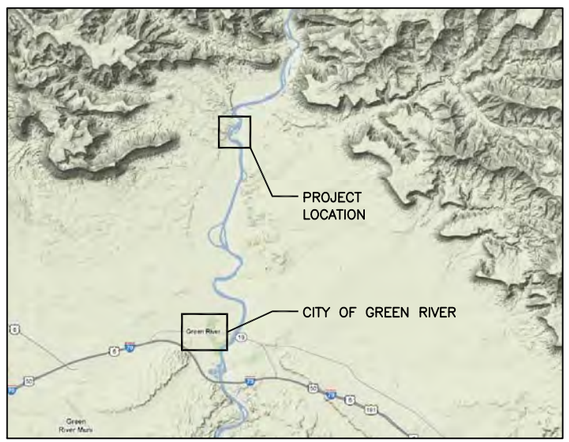
CONCEPT DESIGN
MARCH 7, 2014

NATURAL RESOURCES CONSERVATION SERVICE

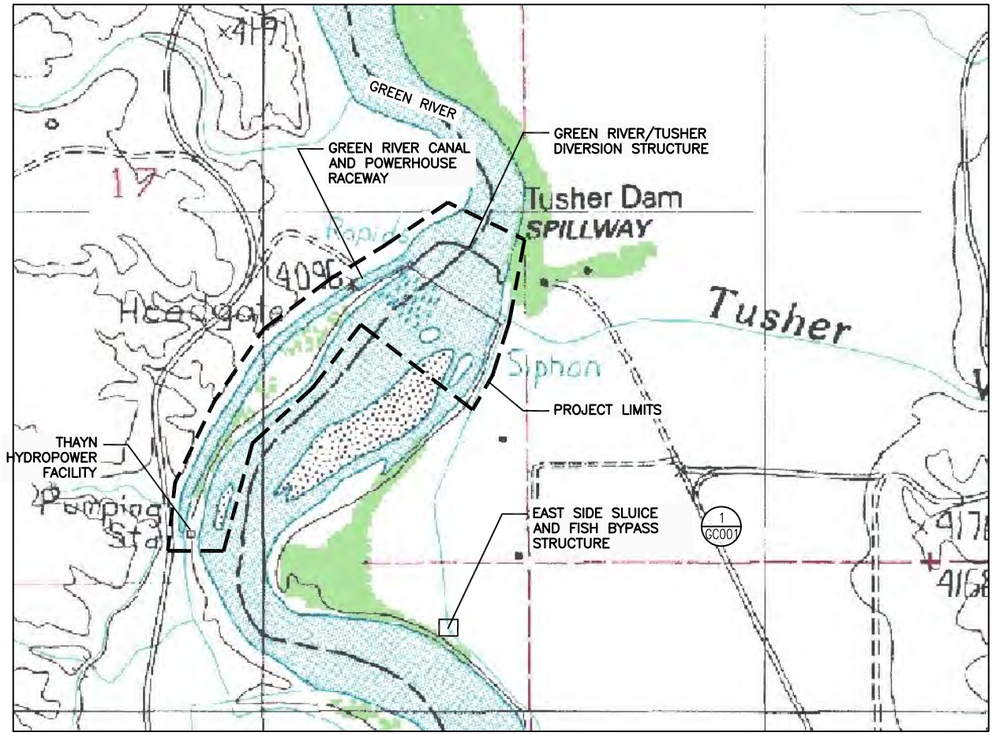
GREEN RIVER
DIVERSION REHABILITATION
DRAFT CONCEPT DESIGN
GRAND AND EMERY COUNTIES



LOCATION MAP
NTS



VICINITY MAP
NTS



PROJECT LIMITS

SECTION 17, TOWNSHIP 20S, RANGE 16E
GRAND AND EMERY COUNTIES, UTAH
LATITUDE - 39°04'43.97" N
LONGITUDE - 110°08'24.56" W

GENERAL NOTES:

1. ELEVATIONS ARE ASSUMED AND SHOWN IN FEET.
2. NO REPRESENTATION IS MADE AS TO THE EXISTENCE OR NON-EXISTENCE OF ANY UTILITIES, PUBLIC OR PRIVATE. WHERE BURIED UTILITIES ARE SHOWN ON THE DRAWINGS, THE LOCATION AND DEPTH MUST BE DETERMINED BY THE UTILITY COMPANY PRIOR TO ANY EXCAVATION IN THE VICINITY OF THE UTILITY. NO WORK SHALL BE DONE WITHIN TEN FEET OF ANY POWER LINES OR POLES WITHOUT THE POWER COMPANY BEING NOTIFIED. EXCAVATION OPERATIONS SHALL COMPLY WITH UTAH STANDARDS.
3. JURISDICTIONAL BOUNDARIES ARE APPROXIMATE AND DISPLAYED AS DOWNLOADED FROM UTAH GIS PORTAL (2012).

DRAWING INDEX

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _G001.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
LOCATION MAP, VICINITY MAP, USGS QUADRANGLE AND DRAWING INDEX

SHEET
G001

ABBREVIATIONS

A	AIR
A	ALARM
A	ANALOG
A, AMP	AMPERE
AB	ANCHOR BOLT
ABBR	ABBREVIATION
ABAN	ABANDON
ABC	AGGREGATE BASE COURSE
AC	ALTERNATING CURRENT
AC	ASPHALT CONCRETE
ACH	AIR CHANGES PER HOUR
ACI	AMERICAN CONCRETE INTERNATIONAL
ACOUS	ACOUSTIC, ACOUSTICAL
ACP	ASPHALTIC CONCRETE PAVEMENT
ACU	AIR CONDITIONING UNIT
ADDL	ADDITIONAL
ADH	ADHESIVE
ADJ	ADJUSTABLE, ADJACENT
AE	AIR EVACUATION
AF	AMP FRAME, AMP FUSE
AFF	ABOVE FINISH FLOOR
AFG	ABOVE FINISH GRADE
AGGR	AGGREGATE
AHU	AIR HANDLING UNIT
AI	AREA INLET
AIC	AMPERES INTERRUPTING CURRENT
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ALIG	ALIGNMENT
ALM	ALARM
ALT	ALTERNATE
ALUM	ALUMINUM
AMB	AMBIENT
ANC	ANCHOR
ANCB	ANCHOR BOLT
ANG	ANGLE
AP	ACCESS PANEL
APPROX	APPROXIMATE
ARCH	ARCHITECTURE
ARV	VALVE, AIR RELIEF
AS	AIR SUPPLY
ASD	ALLOWABLE STRESS DESIGN
ASSY	ASSEMBLY
AT	AMP TRIP
AT	ACOUSTICAL TILE
ATM	ATMOSPHERE
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	VALVE, AIR
AVE	AVENUE
AVG	AVERAGE
B/W	BACK OF WALL
BD	BOARD
BDRY	BOUNDARY
BE	BOTH ENDS, BELL END
BF	BOTH FACES, BOTTOM FACE, BLIND FLANGE, BOARD FEET
BFP	BACK FLOW PREVENTER
BIT	BITUMINOUS
BKG	BACKING
BKR	BREAKER
BL	BASELINE
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BM	BENCHMARK, BEAM
BMP	BEST MANAGEMENT PRACTICE
BOC	BACK OF CURB
BOF	BOTTOM OF FOOTING
BOP	BOTTOM/BEGINNING OF PIPE
BOT	BOTTOM
BP	BASE PLATE
BRG	BEARING
BRGP	BEARING PLATE
BRKT	BRACKET
BS	BOTH SIDES
BTU	BRITISH THERMAL UNIT
BTW	BETWEEN
BTWLD	BUTT WELD
BU	BELL UP, BUILT UP
BUR	BUILT-UP ROOF
BW	BOTH WAYS
C	CENTIGRADE
C	CONDUIT
CA	COMPRESSED AIR
CAB	CABINET
CAV	CONTINUOUS ACTING AIR VALVE
CB	CATCH BASIN
CB	CIRCUIT BREAKER
CBL	CABLE
CC	CENTER TO CENTER
CCB	CONCRETE BLOCK
CCOM	CABLE, COMMUNICATION
CCP	CONCRETE CYLINDER PIPE
CCW	COUNTER CLOCKWISE
CDR	CONDUCTOR
CDU	CONDENSER UNIT
CE	CONCRETE EDGE
CF	CUBIC FEET (FOOT)
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CFP	PUMP, CHEMICAL FEED
CFS	CUBIC FEET PER SECOND
CHD	CHORD
CHEM	CHEMICAL
CHFR	CHAMFER
CHH	COMMUNICATION HANDHOLE
CHNL	CHANNEL
CHR	CHILLER
CIP	CAST IN PLACE
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CL	CENTERLINE, CLASS, CLOSE
CL	CHLORINE
CLF	CHAIN LINK FENCE
CLF	CLARIFIER
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNTL	CONTROL
CO	CLEAN OUT, CONCRETE OPENING
COL	COLUMN
COM	COMMON
COMB	COMBINATION
COMP	COMPOSITION, COMPRESSIBLE, COMPOSITE
COMP	COMPRESSOR
CONC	CONCRETE
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTD	CONTINUED
COORD	COORDINATE
CORR	CORRUGATED
CP	CONTROL POINT
CPEP	CORRUGATED POLYETHYLENE PIPE
CPLG	COUPLING
CPVC	CHLORINATED POLYVINYL CHLORIDE
CR	CONTROL RELAY
CRL	CORROSION RESISTANT LINING
CRNH	CRANES AND HOIST SYSTEMS
CSC	COMPRESSION SLEEVE COUPLING
CSK	COUNTERSINK
CT	CURRENT TRANSFORMER
CT	CERAMIC TILE
CTR	CENTER
CTRL	CONTROL
CU	CUBIC
CULV	CULVERT
CV	VALVE, CONTROL
CW	CLOCKWISE
CW	CHILLED WATER
CWO	CHAIN WHEEL OPORATED
CY	CUBIC YARD
D	DEEP, DIFFUSER
DB	DUCT BANK, DECIBEL, DRY BULB
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DC	DIRECT CURRENT
DEG	DEGREE
DEG C	DEGREE CENTIGRADE
DEG F	DEGREE FAHRENHEIT
DEMO	DEMOLITION
DET	DETAIL
DF	DRINKING FOUNTAIN
DI	DUCTILE IRON
DIA	DIAMETER
DIAG	DIAGONAL, DIAGRAM
DIFF	DIFFERENTIAL, DIFFERENCE
DIM	DIMENSION
DIP	PIPE, DUCTILE IRON
DISC	DISCONNECT
DISCH	DISCHARGE
DIST	DISTANCE, DISTRIBUTION
DIV	DIVISION
DL	DEAD LOAD
DMJ	DOUBLE MECHANICAL JOINT
DO	DISSOLVED OXYGEN
DP	DEPTH
DR	DRAIN
DUP	DUPLICATE
DWG(S)	DRAWING(S)
DWN	DOWN
E	EAST, ELECTRICAL (DWG DISCIPLINE)
EA	EACH
EC	EPOXY COATED REINFORCING
EDB	ELECTRICAL DUCT BANK
EE	EACH END
EEW	EMERGENCY EYE WASH STATION
EF	EACH FACE
EFF	EFFLUENT, EFFICIENCY
EGEN	EMERGENCY GENERATOR SYSTEM
EGL	ENERGY GRADE LINE
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATION
EMBD	EMBEDDED
EMER	EMERGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
EOP	END OF PIPE, EDGE OF PAVEMENT
EPR	ETHYLENE PROPYLENE RUBBER
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
ES	EACH SIDE, EQUAL SPACE
ESEW	EMERGENCY SHOWER AND EYE WASH
EST	ESTIMATE
ETM	ELAPSED TIME METER
EW	EACH WAY
EX	EXISTING
EXH	EXHAUST
EXA	EXPANSION ANCHOR
EXB	EXPANSION BOLT
EXC	EXCAVATION
EXP	EXPANSION, EXPOSED
EXPS	EXPANSION
EXIST	EXISTING
EXT	EXTERIOR, EXTERNAL, EXTENSION
EXTR	EXTRUDED
F	FEMALE
FAB	FABRICATE
FB	FLAT BAR
FBO	FURNISHED BY OWNER
FC	FLUSHING CONNECTION
FCA	FLANGED COUPLING ADAPTER
FD	FLOOR DRAIN
FDC	FLEXIBLE DUCT CONNECTION
FDN	FOUNDATION
FDR	FEEDER
FE	FLANGED END
FE	FIRE EXTINGUISHER
FEM	FEMALE (PIPE THREAD)
FENC	FENCE
FES	FIRE EXTINGUISHER CABINET
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FH	FLAT HEAD
FIG	FIGURE
FL	FLOW, FLOW LINE
FL	SEDIMENT FLUSH
FLEX	FLEXIBLE
FLG	FLANGE, FLANGED
FLR	FLOOR
FM	FORCE MAIN
FO	FINISHED OPENING, FIBER OPTIC
FOC	FACE OF CONCRETE
FOM	FACE OF MASONRY
FOS	FACE OF STUDS
FOT	FLAT ON TOP
FOW	FACE OF WALL
FP	FIRE PROTECTION
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FPT	FEMALE PIPE THREAD
FR	FRAME
FRP	FIBERGLASS REINFORCED PLASTIC
FS	FLOOR SINK
FS	FINISHED SURFACE
FS	SINK, FLOOR
FS	FIRE SYSTEM
FT	FOOT/FEET
FTG	FOOTING, FITTING
FUR	FURRING
FUT	FUTURE
FV	FRONT VIEW
FW	FIELD WELD
FWD	FORWARD
FWE	FURNISHED WITH EQUIPMENT
G	GAS
GA	GAGE (METAL THICKNESS)
GA	GAGE, GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRADE BREAK
GC	GROOVED COUPLING
GEN	GENERAL, GENERATOR
GENR	GENERATOR SYSTEM
GFCI	GROUND-FAULT CIRCUIT INTERRUPTING
GFI	GROUND-FAULT INTERRUPTION
GFP	GROUND-FAULT PROTECTION
GIP	PIPE, GALVANIZED IRON
GND	GROUND
GP	GUY POLE
GPD	GALLONS PER DAY
GPM	GALLONS PER MINUTE
GR	GRADE
GRP	GLASS REINFORCED PLASTIC
GRS	GALVANIZED RIGID STEEL
GRTG	GRATING
GSP	PIPE, GALVANIZED STEEL
GT	GREASE TRAP
GVL	GRAVEL
GYP	GYPSUM
H	HEIGHT
HA	HYDRAULIC ACTUATOR
HB	HOSE BIB
HC	HOSE CONNECTION
HCAB	CABINET, FIRE HOSE
HDPE	HIGH DENSITY POLYETHYLENE
HDR	HEADER
HDW	HARDWARE
HEX	HEXAGONAL
HGL	HYDRAULIC GRADE LINE
HGR	HANGER
HH	HANDHOLE
HLOA	HIGH-LOW-OFF-AUTO
HM	HOLLOW METAL
HM	METAL
HO	HAND OFF
HOA	HAND OFF-AUTO
HOAL	HAND OFF-AUTO LOCAL
HOR	HAND OFF-REMOTE
HORZ	HORIZONTAL
HP	HIGH POINT
HP	HORSEPOWER
HPC	HORIZONTAL POINT OF CURVATURE
HPT	HORIZONTAL POINT OF TANGENCY
HR	HANDRAIL
HR	HOSE REEL
HR	HOUR
HS	HYDRAULIC SUPPLY
HSS	HOLLOW STRUCTURAL SHAPE
HST	HIGH STRENGTH
HST	TANK, HOT WATER
HT	HEIGHT
HTP	PUMP, HEAT
HTR	HEATER
HVAC	HEATING, VENTILATION, & AIR CONDITIONING
HWL	HIGH WATER LEVEL
HWO	HAND WHEEL OPERATED
HWR	WATER HEATER RETURN
HWS	WATER HEATER SUPPLY
HYD	HYDRAULIC
HYD	HYDRANT
HZ	HERTZ (CYCLES PER SECOND)
I&C	INSTRUMENTATION AND CONTROL
I/O	INPUT/OUTPUT
IA	INSTRUMENT AIR
IAIR	INSTRUMENT AIR SYSTEM
IAS	INSTRUMENT AIR SUPPLY
IBC	INTERNATIONAL BUILDING CODE
IC	INSULATION CONTACTOR
ID	INSIDE (OR INTERNAL) DIAMETER
IE	INVERT ELEVATION
IF	INSIDE FACE
IG	ISOLATED GROUND
IKS	INTAKE STRUCTURE
IN	INCH/INCHES
INCL	INCLUDE, INCLUDING
INF	INFLUENT
INST	INSTANTANEOUS
INSTR	INSTRUMENTATION
INT	INTERSECTION
INTLK	INTERLOCK
INTR	INTERMEDIATE
INV	INVERT
IP	PIPE, IRON
IPB	ILLUMINATED PUSH BUTTON
IPS	IRON PIPE SIZE
IPT	INTERNAL PIPE THREAD
IR	INSIDE RADIUS
IRR	IRRIGATION
ISL	INSULATION
ISO	ISOMETRIC
IT	INDICATING TRANSMITTER
JB	JUNCTION BOX (J-BOX)
JCT	JUNCTION
JF	JOINT FILLER
JSTS	JOISTS
JT	JOINT
K	KILO, KELVIN
KIP	KIP (1000 POUNDS)
KO	KNOCK OUT
KV	KILOVOLTS
KVA	KILOVOLT AMPERES (APPARENT POWER)
KVAR	KILOVARS (REACTIVE POWER)
KW	KILOWATTS (REAL POWER)
KWH	KILOWATT HOUR
L	LENGTH, LITER
LADR	LADDER
LATL	LATERAL
LAV	LAVATORY
LB	LAG BOLT, POUND
LE	LIFTING EYE
LF	LINEAR FOOT
LG	LONG
LIN	LINEAR
LIQ	LIQUID
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LOC	LOCATION
LONG	LONGITUDINAL
LP	LOW POINT
LP	LOW PRESSURE
LR	LOCAL-REMOTE
LS	LIFT STATION
LT	LEFT
LTD	LIMITED
LTFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT
LTG	LIGHTING
LV	LOW VOLTAGE
LV	LOUVER
LW	LIGHTWEIGHT
LWC	LIGHTWEIGHT CONCRETE
LWL	LOW WATER LEVEL
M	METER, MALE
MA	MILLIAMPERES
MA	ACTUATOR, MOTOR
MAINT	MAINTENANCE
MAN	MACHINED
MAN	MANUAL
MAS	MASONRY
MAT	MATERIAL
MAX	MAXIMUM
MB	MACHINE BOLT
MC	MECHANICAL COUPLING
MECH	MECHANICAL
MCC	MOTOR CONTROL CENTER
MCP	MAIN CONTROL PANEL
MED	MEDIUM
MFR	MANUFACTURER
MH	MANHOLE
MI	MILE
MIN	MINIMUM
MIR	MIRROR
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MO	MASONRY OPENING
MOD	MODIFY
MON	MONUMENT
MPT	MALE PIPE THREAD
MS	SINK,MOP
MSL	MEAN SEA LEVEL
MT	MOUNT
MTC	MECHANICAL-TYPE COUPLING
MTS	MANUAL TRANSFER SWITCH
MU	MASONRY UNIT
Mv	MILLIVOLTS
N	NORTH, NEUTRAL
N/A	NOT APPLICABLE
NAT	NATURAL
NC	NORMALLY CLOSED
NEG	NEGATIVE
NF	NON-FUSED
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO	NUMBER, NORMALLY OPEN
NOM	NOMINAL
NP	NAMEPLATE
NPS	NOMINAL PIPE SIZE
NPSH	NET POSITIVE SUCTION HEAD
NPT	NATIONAL PIPE THREAD
NRS	NON-RISING STEM
NS	NATURAL SUPPLY
NS	NEAR SIDE
NT	NORMALLY THROTTLED
NTS	NOT TO SCALE
NWL	NORMAL WATER LEVEL
O TO O	OUT-TO-OUT
O&M	OPERATIONS AND MAINTENANCE
OAC	OPEN-AUTOMATIC-CLOSED
OC	ON CENTER
OD	OUTSIDE DIAMETER
OED	OPEN END DUCT
OF	OUTSIDE FACE
OF	OVERFLOW
OFF	OFFICE
OG	ORIGINAL GROUND
OH	OVERHEAD
OL	OVERLOAD
OPNG	OPENING
OPP	OPPOSITE
OPT	OPTIONAL
OR	OUTSIDE RADIUS
ORIG	ORIGINAL
OUT	OUTLET
OVFL	OVERFLOW
OVHG	OVERHANG
OZ	OUNCE
P	PRESSURE, PUMP
PA	PLANT AIR
PA	ACTUATOR, PNEUMATIC
PAR	PARALLEL
PB	PULL BOX
PBD	PANEL BOARD
PC	POINT OF CURVE, PRECAST
PCC	POINT OF COMPOUND CURVATURE
PCC	PORTLAND CEMENT CONCRETE
PCF	POUNDS PER CUBIC FOOT
PCT	PERCENT
PED	PEDESTAL
PEN	PENETRATION
PERF	PERFORATED
PERM	PERMANENT
PERP	PERPENDICULAR
PH	PHASE
PI	POINT OF INTERSECTION
PL	PLATE, PROPERTY LINE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLWD	PLYWOOD
PMR	POWER MONITOR
PN	PNEUMATIC
PNL	PANEL
POB	POINT OF BEGINGING
POE	POINT OF END
POS	POSITIVE, POSITION
PP	POWER POLE
PP	POLYPROPYLENE
PR	SHIELDED PAIR
PRC	POINT OF REVERSE CURVATURE
PRCP	POWER RECEPTACLE
PRCT	PRECAST
PREFAB	PREFABRICATED
PRELIM	PRELIMINARY
PREP	PREPARE
PRES	PRESSURE
PRI	PRIMARY
PROF	PROFILE
PROP	PROPERTY
PROT	PROTECTION
PRP	PROPANE
PRV	VALVE, PRESSURE RELIEF OR REDUCING
PS	PIPE SUPPORT
PS	PUMP STATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	POINT, POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PW	POTABLE WATER
PZ	PIEZOMETER
Q	RATE OF FLOW
QTR	QUARTER
QTY	QUANTITY
QUAL	QUALITY
R	RADIUS
R&R	REMOVE AND REPLACE
R&S	REMOVE AND SALVAGE
RA	AIR, RETURN
RC	REINFORCED CONCRETE
RCCP	REINFORCED CONCRETE CYLINDER PIPE
RCP	RECEPTICLE
RCP	PIPE, REINFORCED CONCRETE
RD	ROUND
REC	RECESS
RECD	RECEIVED
RECT	RECTANGULAR
RED	REDUCER
REF	REFERENCE
REINF	REINFORCE/REINFORCED
REM	REMOVE
REQD	REQUIRED
RESIL	RESILIENT
RET	RETAINING
RET	RETURN
REV	REVISION
RFG	ROOFING
RGH	ROUGH
RGS	RIGID GALVANIZED STEEL
RGS-PVC	PVC COATED RGS
RLY	RELAY
RM	ROOM
RND	ROUND
ROW	RIGHT OF WAY
RP	RADIUS POINT
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RS	RISING STEM
RT	RIGHT
RTD	RESISTANCE TEMPERATURE DETECTOR
RTH	RIGHT HAND
RW	WATER, RAW
S	SOUTH, SLOPE
SA	AIR, SUPPLY
SAN	SANITARY
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SCH	SCHEDULE
SCHEM	SCHEMATIC
SCL	SCALE
SCN	SCREEN
SD	STORM DRAIN
SEC	SECONDARY, SECONDS
SECT	SECTION
SEL	SELECTOR
SEP	SEPARATE
SEPS	SANITARY SEPTIC SYSTEM
SF	SQUARE FOOT/FEET
SHELV	SHELVING
SHR	SHOWER
SHT	SHEET
SHTG	SHEATHING
SL	SLOPE
SLTD	SLOTTED
SLV	SLEEVE
SOG	SLAB ON GRADE
SP	PIPE STEEL
SP	PUMP, SUMP
SPA	SPACING
SPEC	SPECIFICATION
SPLY	SUPPLY
SQ	SQUARE
SS	SANITARY SEWER
SS	STAINLESS STEEL
STA	STATION, STAIR
STC	SLEEVE-TYPE COUPLING
STD	STANDARD
STIFF	STIFFENER
STIR	STIRRUP
STL	STEEL
STLG	STOPLOG
STOR	STORAGE
STR	STRAIGHT
SUB	SUBSTITUTE
SUC	SUCTION
SUMP	SUMP
SUSP	SUSPENDED
SV	VALVE, SOLENOID
SW	SWITCH
SW	WATER, SERVICE
SWGR	SWITCH GEAR
SWLK	SIDEWALK
SWPPP	STORMWATER POLLUTION PREVENTION PLAN
SY	SQUARE YARD
SYM	SYMBOL
SYMM	SYMMETRICAL
SYN	SYNTHETIC
SYS	SYSTEM
T	TEMPERATURE
T&B	TOP AND BOTTOM
TAN	TANGENT
TB	TERMINAL BLOCK
TBM	TEMPORARY BENCHMARK
TDH	TOTAL DYNAMIC HEAD
TEL	TELEPHONE
TEMP	TEMPERATURE
TEMP	TEMPORARY
THD	THREAD
TK	TANK
TMTR	THERMOMETER
TO OPNG	TOP OF OPENING
TOA	TEST-OFF-AUTO
TOB	TOP OF BANK
TOC	TOP OF CONCRETE
TOCMU	TOP OF CMU
TOCOL	TOP OF COLUMN
TOD	TOP OF DUCT
TOF	TOP OF FOOTING
TOG	TOP OF GRATING
TOL	TOLERANCE
TOM	TOP OF MASONRY
TOP	TOP OF PLATE/PIPE
TOPO	TOPOGRAPHIC
TOS	TOP OF SLAB/STEEL
TOW	TOP OF WALL
TP	TELEPHONE POLE
TRANS	TRANSITION
TRD	TRENCH DRAIN
TRT	TREAT, TREATMENT
TSP	TWISTED SHIELDED PAIR
TSS	TOTAL SUSPENDED SOLIDS
TST	TWISTED SHIELDED TRIAD
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
UFC	UNIFORM FIRE CODE
UG	UNDERGROUND
UHMWULTA	HIGH MOLECULAR WEIGHT
ULT	ULTIMATE
UNO	UNLESS NOTED OTHERWISE
UP	UTILITY POWER, UTILITY POLE
UPC	UNIFORM PLUMBING CODE
UPS	UNINTERRUPTED POWER SUPPLY
URN	URINAL
UTIL	UTILITY
V	VALVE, VAULT, VENT, VOLT(S)
VA	VOLT AMPERE
VAC	VACUUM, VOLTS ALTERNATING CURRENT
VAR	VARIES, VARIABLE
VB	VALVE BOX
VC	VERTICAL CURVE
VCP	PIPE, VITRIFIED CLAY
VCT	VERTICAL CENTERLINE
VDC	VOLTS DIRECT CURRENT
VEL	VELOCITY
VENT	VENTILATION
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VIN	VINYL
VOL	VOLUME
VPC	VERTICAL POINT OF CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
VSD	VARIABLE SPEED DRIVE
VTC	VENT TO CEILING
VTR	VENT THROUGH ROOF
VTR	VENT TO ROOF
W	WEST, WIRE, WASTE, WIDE
W/	WITH
W/O	WITHOUT
WC	WATER COLUMN
WD	WIDTH, WOOD
WDW	WINDOW
WFLG	WIDE FLANGE
WG	WATER GAGE
WL	WATER LEVEL
WLD	WELDED
WM	WIRE MESH
WP	WATERPROOF
WP	PRESSURE, WORKING
WP	WATERPROOFING
WS	WATER SURFACE, WATER SUPPLY
WSP	PIPE, WELDED STEEL
WSTP	WATERSTOP
WT	WEIGHT, WATERTIGHT
WTHP	WEATHERPROOF
WW	WASTEWATER
WWF	WELDED WIRE FABRIC
XA	AIR, EXHAUST
XLPE	CROSS LINKED POLYETHYLENE
XMFR	TRANSFORMER
XP	EXPLOSION PROOF
XSEC	CROSS SECTION
YD	YARD
YR	YEAR
&	AND
@	AT
ø	DIAMETER
#, NO.	NUMBER

GENERAL NOTES:

1. THESE ABBREVIATIONS APPLY TO THE ENTIRE SET OF DRAWINGS.
2. LISTING OF ABBREVIATIONS DOES NOT IMPLY ALL ABBREVIATIONS ARE USED IN THE CONTRACT DRAWINGS.
3. ABBREVIATIONS SHOWN ON THIS SHEET INCLUDE VARIATIONS OF THE WORD. FOR EXAMPLE, "MOD" MAY MEAN MODIFY OR MODIFICATION; "INC" MAY MEAN INCLUDED OR INCLUDING; "REINF" MAY MEAN EITHER REINFORCE OR REINFORCING.

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA

DATE: 07 MARCH 2014
CAD FILENAME: _G002.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAMMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
STANDARD ABBREVIATIONS

SHEET
G002

SHEET SYMBOLS

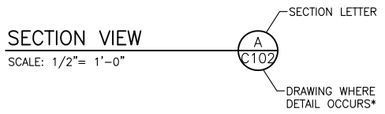
ARROW INDICATES DIRECTION OF PLAN NORTH

PLAN
SCALE: 1/2"= 1'-0"

SECTION IDENTIFICATION

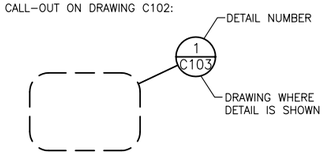
(1) SECTION CUT ON DRAWING C102:

(2) ON DRAWING C103 THIS SECTION IS IDENTIFIED AS:

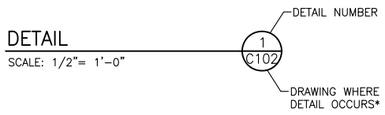


DETAIL IDENTIFICATION

(1) DETAIL CALL-OUT ON DRAWING C102:



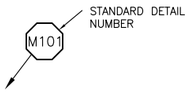
(2) ON DRAWING C103 THIS SECTION IS IDENTIFIED AS:



*NOTE: IF PLAN AND SECTION (OR DETAIL CALL-OUT AND DETAIL) ARE SHOWN ON SAME DRAWING. DRAWING NUMBER IS REPLACED BY A LINE.

STANDARD DETAIL IDENTIFICATION

(1) DETAIL CALL-OUT ON PLAN OR SECTION:



(2) ON DETAIL DRAWINGS, IDENTIFIED AS:

SITE PLAN LINE TYPES

X X	FENCE LINE
P P	OVERHEAD POWER
455	MAJOR CONTOUR
456	MINOR CONTOUR
	EDGE OF WATERLINE
TOE	TOE OF SLOPE
TOB	TOP OF BANK
SS SS	SANITARY SEWER
SD SD	STORM DRAIN
EP EP	EDGE OF PAVEMENT
EG EG	EDGE OF GRAVEL
W	WATTLE
SF SF	SILT FENCE
CF CF	CONSTRUCTION FENCE
GAS	GAS LINE

SITE PLAN SYMBOLS

	CONIFER TREE: FIR, SPRUCE, LARCH OR PINE, 8" DIAMETER OR LARGER.
	DECIDUOUS TREE: COTTONWOOD, HAWTHORN, ASPEN, 8" DIAMETER OR LARGER.
MH	MANHOLE
EB	ELECTRIC BOX
	STORM DRAIN MANHOLE
FH	FIRE HYDRANT
YH-X	YARD HYDRANT
	SURVEY CONTROL POINT, AS NOTED.
	POLE ANCHOR
	POWER POLE
	LIGHT POLE
	SIGN
WS	EDGE OF WATER
P/L	PROPERTY LINE
IRR	UNDERGROUND IRRIGATION PIPELINE

HATCH SYMBOLS

	ROCK, TYPE AS NOTED (PLAN/SECTION)
	BED ROCK
	EXISTING GRADE (SECTION)
	NEW SOIL (SECTION)
	CONCRETE (SECTION/PLAN)
	COMPACTED STRUCTURAL FILL
	STEEL (SECTION)
	GRATING (PLAN)
	MASONRY (PLAN)
	WOOD, SIZE/TYPE AS NOTED (PLAN)
	WOOD, SIZE/TYPE AS NOTED (SECTION)
	RIP RAP (PLAN/SECTION)
	DAMAGED CONCRETE
	DEMOLISH STRUCTURE

GENERAL NOTES:

1. NOT ALL SYMBOLS ARE NECESSARILY USED. THIS IS A STANDARD DRAWING SHOWING COMMON SYMBOLS ON THIS PROJECT.
2. SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH DRAWING FOR USAGE.

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _G003.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
STANDARD SYMBOLS

SHEET
G003

NOTES:
1. PROPERTY BOUNDARY DATA OBTAINED FROM UTAH STATE LAND BOUNDARY GIS.
2. EDGE OF WATER APPROXIMATED BASED ON EXTENTS SHOWN ON AERIAL PHOTOGRAPH.

EXISTING SITE PLAN
SCALE: 1"= 150'

0" 150' 300'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
EXISTING SITE PLAN

SHEET
G004

NOTES:
1. PROPERTY BOUNDARY DATA OBTAINED FROM UTAH STATE LAND BOUNDARY GIS.
2. EDGE OF WATER APPROXIMATED BASED ON EXTENTS SHOWN ON AERIAL PHOTOGRAPH.
3. UNDERGROUND EAST SIDE CANAL PIPE/SIPHON LOCATION IS APPROXIMATED.

EXISTING DIVERSION STRUCTURE – ENLARGED PLAN

SCALE: 1"= 40'

0' 40' 80'

1 G004

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _G005.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
EXISTING DIVERSION STRUCTURE
ENLARGED PLAN

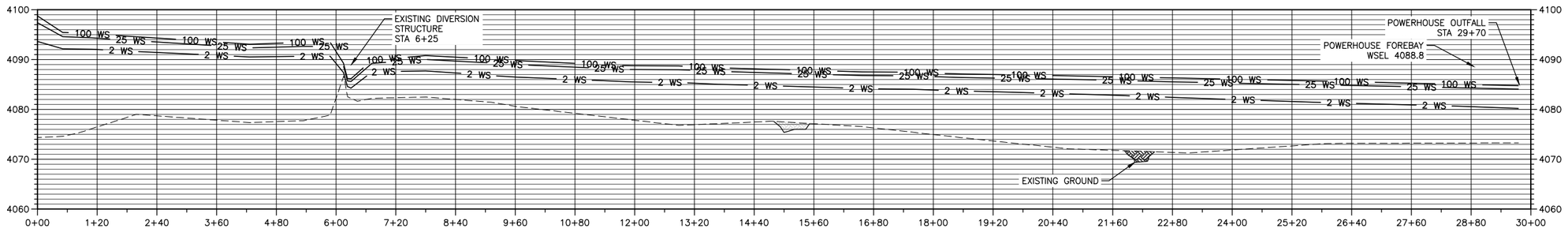
SHEET
G005

NOTE:

1. POWERHOUSE RACEWAY WSEL BASED ON AVERAGE VALUES OBTAINED BY USBR (2005).
2. DIVERSION STRUCTURE SHOWN AT INTERSECTION WITH GREEN RIVER CENTERLINE. PROFILE OF RACEWAY BEGINS AT WEST END OF DAM CETNERLINE, WHICH IS DOWNSTREAM OF THE INTERSECTION OF THE GREEN RIVER CENTERLINE AND THE DAM CENTERLINE
3. WATER SURFACE ELEVATIONS DEPICTED ON PROPOSED DIVERSION HYDRAULIC SECTION ARE DERIVED FROM HYDRAULIC SIMULATIONS WITH THE RADIAL GATES OPENED ON BOTH SIDES OF THE DIVERSION DAM.
4. WATER SURFACE ELEVATIONS DEPICTED ON THE HYDRAULIC PROFILE DRAWINGS REPRESENT EXISTING SITE CONDITIONS; WATER SURFACE ELEVATIONS DEPICTED ON THE PROPOSED DIVERSION HYDRAULIC SECTION REPRESENT PROPOSED CONDITIONS.

LEGEND:

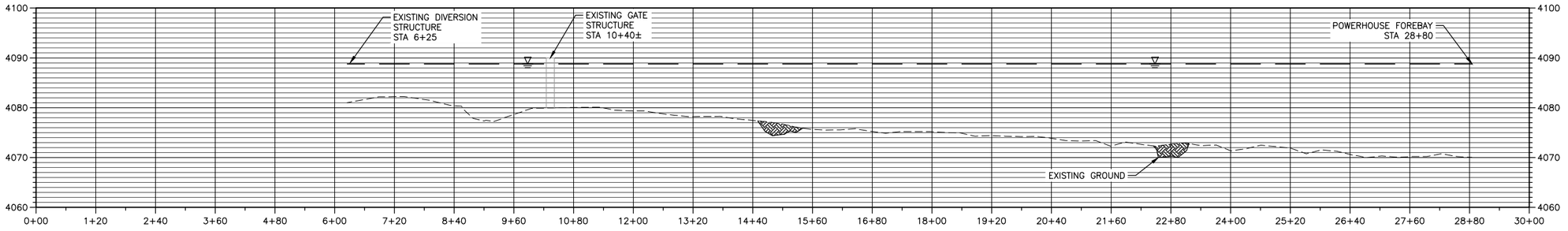
- EXIST GROUND SURFACE
- 2 WS — 2YR RUNOFF WATER SURFACE ELEV
- 25 WS — 25YR RUNOFF WATER SURFACE ELEV
- 100 WS — 100YR RUNOFF WATER SURFACE ELEV.
- POWERHOUSE RACEWAY WATER SURFACE ELEV.



HYDRAULIC PROFILE – GREEN RIVER

SCALE: 1"=120' HORIZ
1"=10' VERT

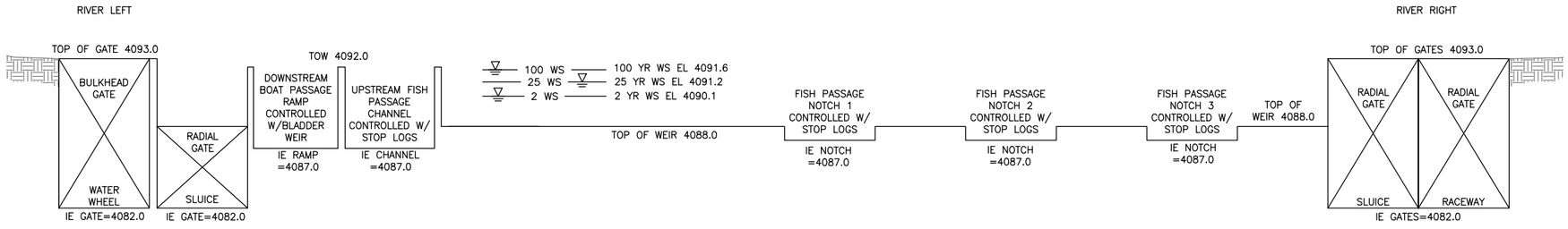
0" 120' 240'
0" 10' 20'



HYDRAULIC PROFILE – POWERHOUSE RACEWAY

SCALE: 1"=120' HORIZ
1"=10' VERT

0" 120' 240'
0" 10' 20'



PROPOSED DIVERSION HYDRAULIC SECTION

NTS

DESIGN CRITERIA	
CRITERIA	VALUE
DRAINAGE BASIN	
DRAINAGE AREA	40,500 SQUARE MILES
MEAN ANNUAL PRECIPITATION	15.9 INCHES
MEAN BASIN ELEVATION	7,230 FT
AVERAGE BASIN SLOPE	12.9%
UNCONTROLLED DRAINAGE AREA	15,700 SQUARE MILES
CONTROLLED DRAINAGE AREA	24,500 SQUARE MILES
HYDROLOGY	
LOW RECURRENCE FLOWS	869
2–YEAR RETURN INTERVAL FLOW	21,386 CFS
25–YEAR RETURN INTERVAL FLOW	40,726 CFS
100–YEAR RETURN INTERVAL FLOW	48,170 CFS
DESIGN CRITERIA	
IRRIGATION AND HYDROPOWER FLOWS	819 CFS
FISH BYPASS FLOW	30 CFS
UPSTREAM FISH PASSAGE FLOW	30 CFS
DOWNSTREAM FISH PASSAGE FLOW	40 CFS
DOWNSTREAM BOAT PASSAGE FLOW	147 CFS
TOTAL MINIMUM FLOW REQUIREMENT	1,066 CFS

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA
NRCS

DATE: 07 MARCH 2014
CAD FILENAME: _G006.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: M. NELSON
SUBMITTED BY: D. AXNESS

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SALT LAKE CITY, UT 84138-1100

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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
HYDRAULIC PROFILE AND DESIGN CRITERIA

SHEET
G006

KEY PLAN
SCALE: 1"= 150'
0" 150' 300'

EAST SIDE SLUICE STRUCTURE AND FISH BYPASS INSET
SCALE: 1"= 100'
0" 100' 200'
1 G001

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _GC001.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

NATURAL RESOURCES CONSERVATION SERVICE
125 SOUTH STATE STREET, ROOM 4010
SALT LAKE CITY, UT 84138-1100

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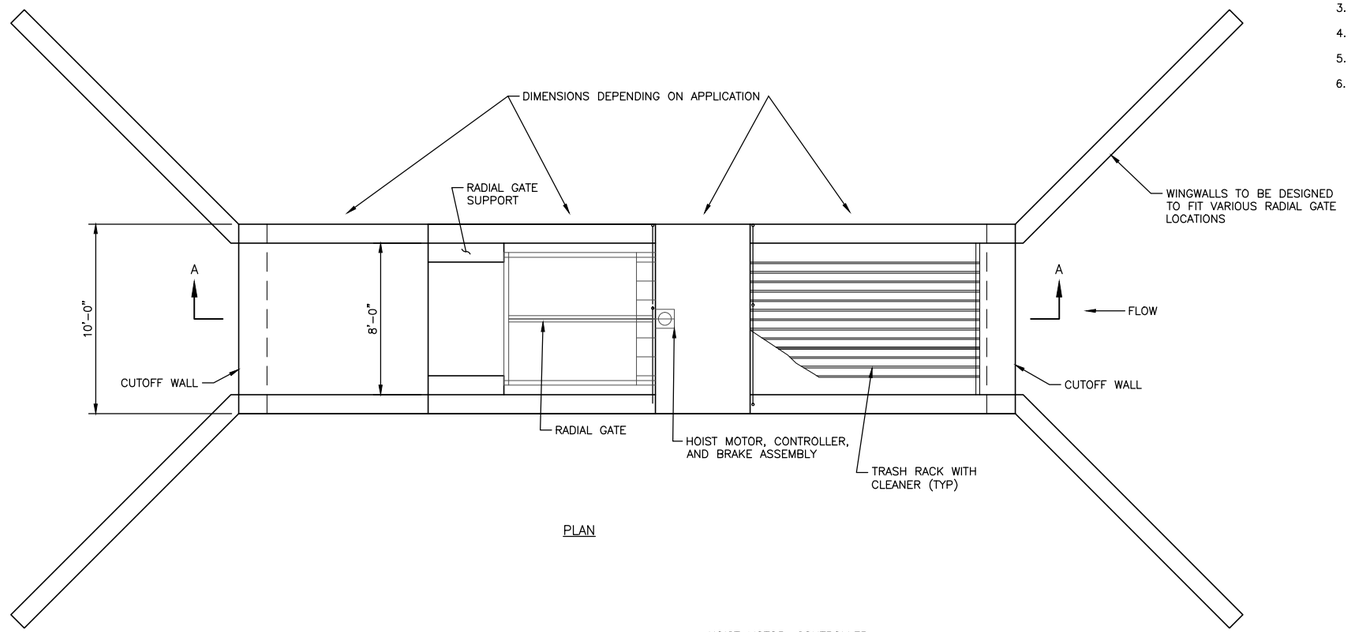
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
KEY PLAN

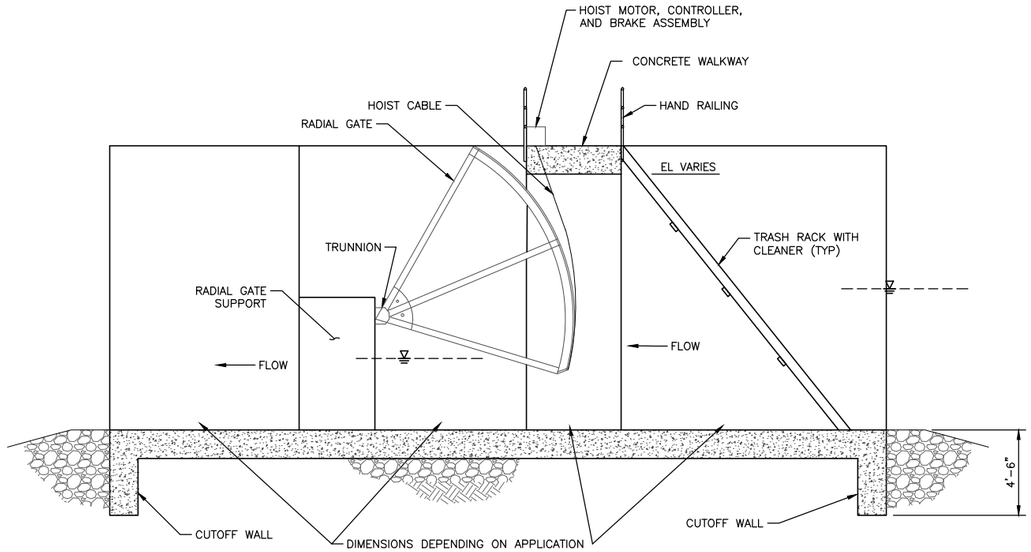
SHEET
GC001

GENERAL NOTES:

1. THESE DRAWINGS ARE CONCEPTUAL IN NATURE AND HAVE BEEN USED TO DEVELOP INITIAL COST ESTIMATES.
2. THE SHAPES, DIMENSIONS AND QUANTITIES ARE BASED ON PREVIOUS PROJECT EXPERIENCE WITH SIMILAR TREATMENTS AND STRUCTURES. EACH OF THE TREATMENTS WILL REQUIRE A FINAL DESIGN SEALED BY A PROFESSIONAL ENGINEER PRIOR TO PRODUCTION OF CONSTRUCTION DRAWINGS.
3. THE DESIGN DETAILS PRESENTED ON THIS SHEET ARE CONCEPTUAL DETAILS AND WILL REQUIRE ADDITIONAL ANALYSIS AND INFORMATION TO COMPLETE THE FINAL DESIGN.
4. SOME DETAILS HAVE BEEN INCLUDED AS ALTERNATIVES TO A SPECIFIC PROBLEM AND NOT ALL THE DETAILS PROVIDED ON THIS SHEET WILL BE INCLUDED AS PART OF THE FINAL DESIGN.
5. FINAL DESIGN SHALL ADDRESS THE EFFECTS OF INSTALLING PROPOSED GRADE CONTROLS ON REGULATORY FLOODS FOR FEMA AND GRAND AND EMORY COUNTIES.
6. ACTUAL DIMENSIONS WILL VARY DEPENDING ON RADIAL GATE LOCATION.



PLAN



SECTION A–A

TYPICAL RADIAL GATE

SCALE: NTS

1

FINAL CONCEPT DESIGN
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DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
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DATE: 07 MARCH 2014
CAD FILENAME: _GC002.DWG
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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
CIVIL DETAILS 1

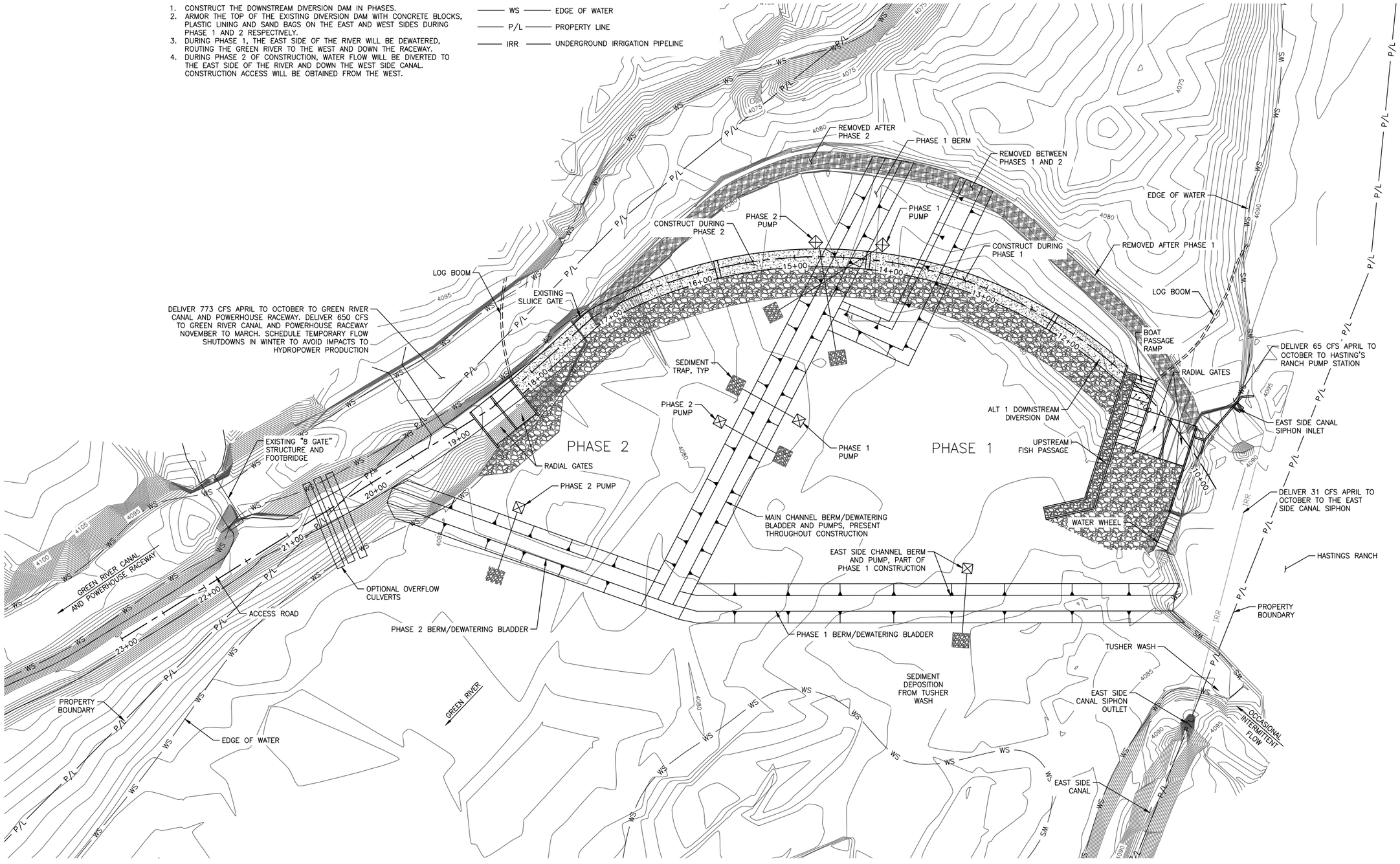
SHEET
GC002

SHEET NOTES:

1. CONSTRUCT THE DOWNSTREAM DIVERSION DAM IN PHASES.
2. ARMOR THE TOP OF THE EXISTING DIVERSION DAM WITH CONCRETE BLOCKS, PLASTIC LINING AND SAND BAGS ON THE EAST AND WEST SIDES DURING PHASE 1 AND 2 RESPECTIVELY.
3. DURING PHASE 1, THE EAST SIDE OF THE RIVER WILL BE DEWATERED, ROUTING THE GREEN RIVER TO THE WEST AND DOWN THE RACEWAY.
4. DURING PHASE 2 OF CONSTRUCTION, WATER FLOW WILL BE DIVERTED TO THE EAST SIDE OF THE RIVER AND DOWN THE WEST SIDE CANAL. CONSTRUCTION ACCESS WILL BE OBTAINED FROM THE WEST.

LEGEND

WS — EDGE OF WATER
P/L — PROPERTY LINE
IRR — UNDERGROUND IRRIGATION PIPELINE



CONSTRUCTION PHASING AND DEWATERING PLAN – ALT 1 DOWNSTREAM DIVERSION DAM

SCALE: 1"= 50'

0" 50' 100'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _GC003.DWG
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GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
CONSTRUCTION PHASING AND DEWATERING PLAN - ALT 1 DOWNSTREAM DIVERSION DAM

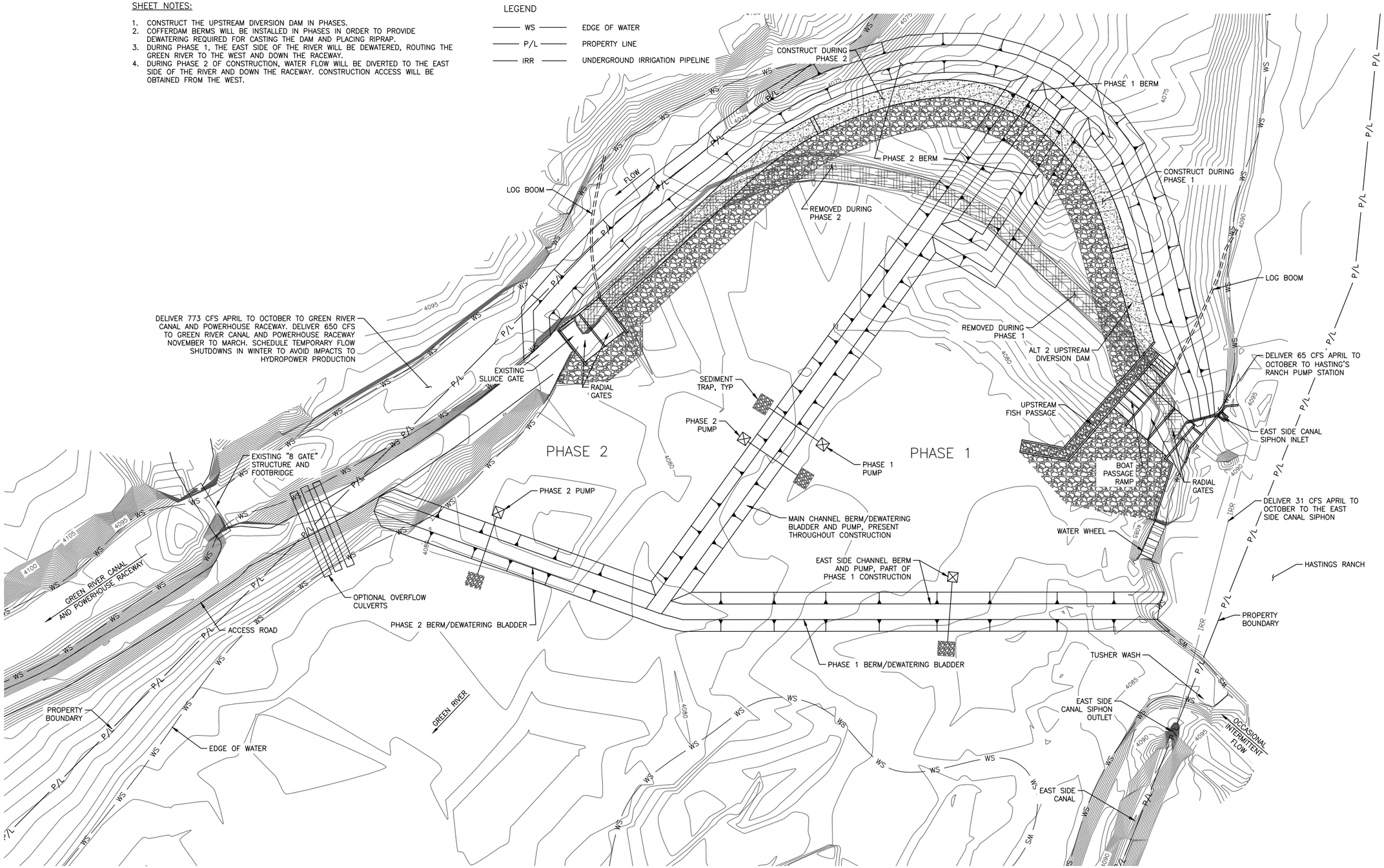
SHEET
GC003

SHEET NOTES:

1. CONSTRUCT THE UPSTREAM DIVERSION DAM IN PHASES.
2. COFFERDAM BERMS WILL BE INSTALLED IN PHASES IN ORDER TO PROVIDE DEWATERING REQUIRED FOR CASTING THE DAM AND PLACING RIPRAP.
3. DURING PHASE 1, THE EAST SIDE OF THE RIVER WILL BE DEWATERED, ROUTING THE GREEN RIVER TO THE WEST AND DOWN THE RACEWAY.
4. DURING PHASE 2 OF CONSTRUCTION, WATER FLOW WILL BE DIVERTED TO THE EAST SIDE OF THE RIVER AND DOWN THE RACEWAY. CONSTRUCTION ACCESS WILL BE OBTAINED FROM THE WEST.

LEGEND

WS — EDGE OF WATER
P/L — PROPERTY LINE
IRR — UNDERGROUND IRRIGATION PIPELINE



CONSTRUCTION PHASING AND DEWATERING PLAN – ALT 2 UPSTREAM DIVERSION DAM

SCALE: 1"= 50'

0" 50' 100'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _GC004.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
125 S. STATE STREET, ROOM 4402
SALT LAKE CITY, UT 84138-1100

McMILLEN, LLC
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BOISE, ID 83702
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FAX: 208.342.4216

NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
CONSTRUCTION PHASING AND DEWATERING PLAN - ALT 2 UPSTREAM DIVERSION DAM

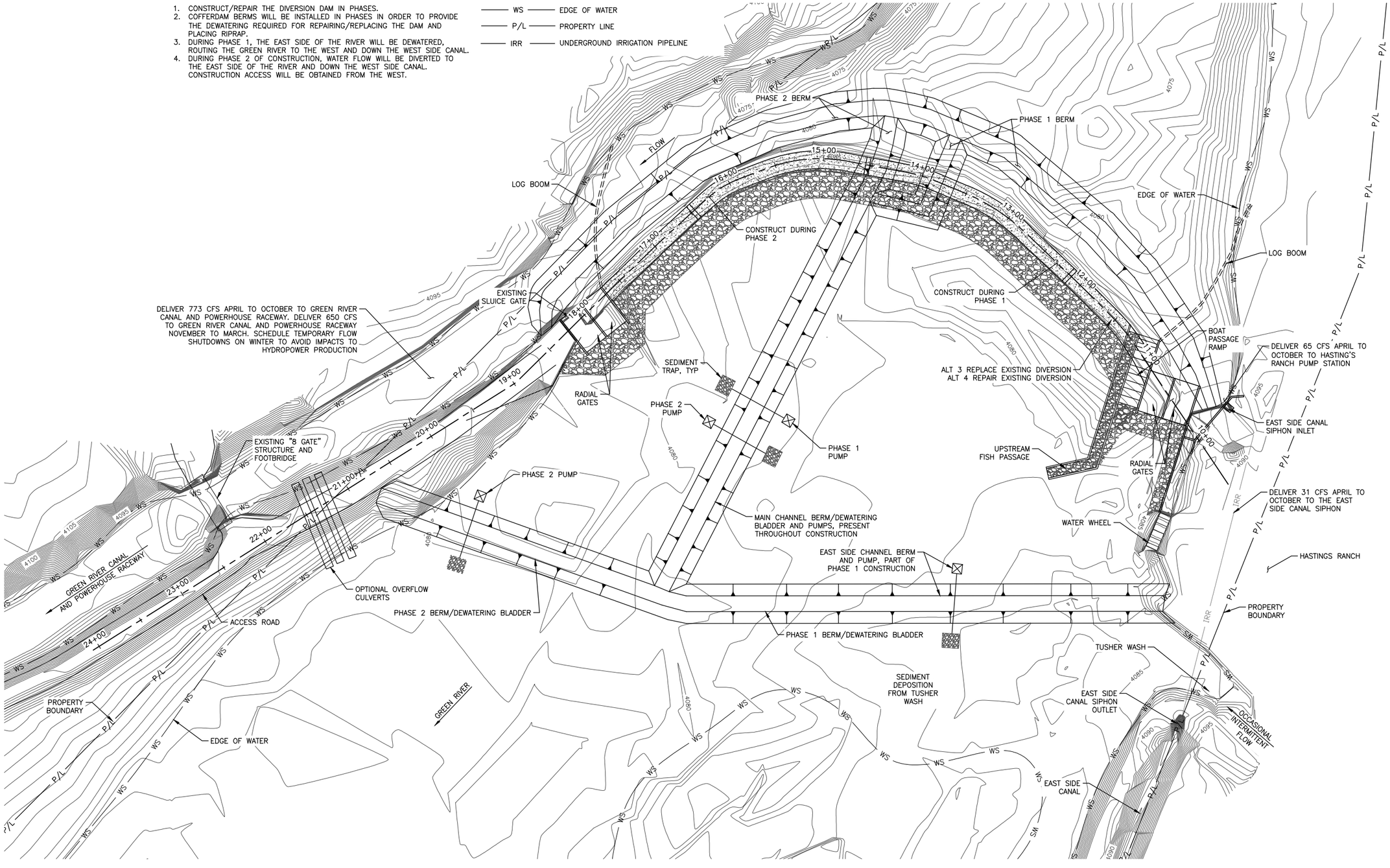
SHEET
GC004

SHEET NOTES:

1. CONSTRUCT/REPAIR THE DIVERSION DAM IN PHASES.
2. COFFERDAM BERMS WILL BE INSTALLED IN PHASES IN ORDER TO PROVIDE THE DEWATERING REQUIRED FOR REPAIRING/REPLACING THE DAM AND PLACING RIPRAP.
3. DURING PHASE 1, THE EAST SIDE OF THE RIVER WILL BE DEWATERED, ROUTING THE GREEN RIVER TO THE WEST AND DOWN THE WEST SIDE CANAL.
4. DURING PHASE 2 OF CONSTRUCTION, WATER FLOW WILL BE DIVERTED TO THE EAST SIDE OF THE RIVER AND DOWN THE WEST SIDE CANAL. CONSTRUCTION ACCESS WILL BE OBTAINED FROM THE WEST.

LEGEND

WS — EDGE OF WATER
P/L — PROPERTY LINE
IRR — UNDERGROUND IRRIGATION PIPELINE



CONSTRUCTION PHASING AND DEWATERING PLAN – ALT 3 AND 4 REPLACE/REPAIR DIVERSION DAM

SCALE: 1"= 50'

0" 50' 100'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA NRCS UDAF

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

DATE: 07 MARCH 2014
CAD FILENAME: _GC005.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
CONSTRUCTION PHASING AND DEWATERING PLAN - ALTS 3 AND 4 REPLACE/REPAIR DAM

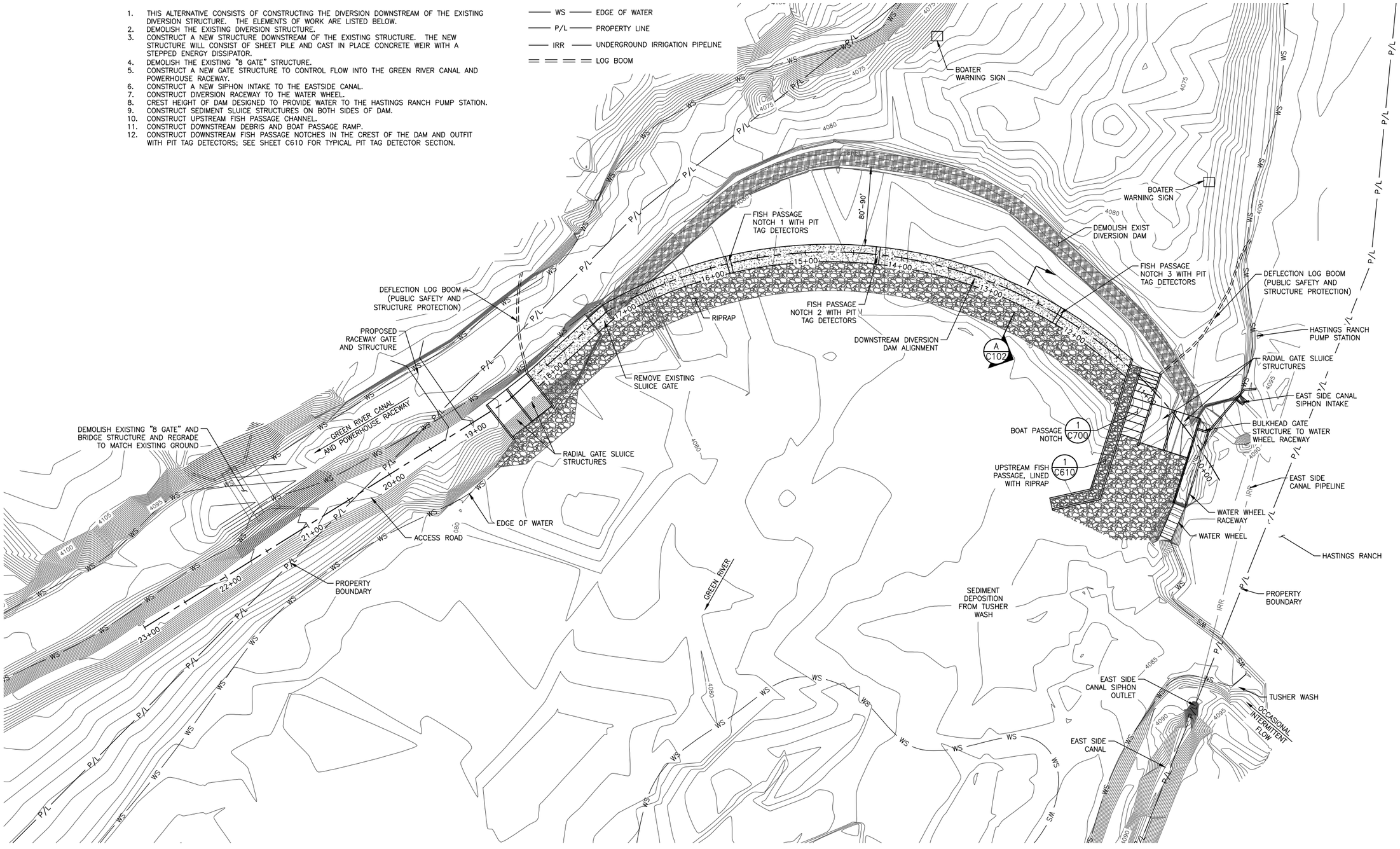
SHEET
GC005

SHEET NOTES:

1. THIS ALTERNATIVE CONSISTS OF CONSTRUCTING THE DIVERSION DOWNSTREAM OF THE EXISTING DIVERSION STRUCTURE. THE ELEMENTS OF WORK ARE LISTED BELOW.
2. DEMOLISH THE EXISTING DIVERSION STRUCTURE.
3. CONSTRUCT A NEW STRUCTURE DOWNSTREAM OF THE EXISTING STRUCTURE. THE NEW STRUCTURE WILL CONSIST OF SHEET PILE AND CAST IN PLACE CONCRETE WEIR WITH A STEPPED ENERGY DISSIPATOR.
4. DEMOLISH THE EXISTING "8 GATE" STRUCTURE.
5. CONSTRUCT A NEW GATE STRUCTURE TO CONTROL FLOW INTO THE GREEN RIVER CANAL AND POWERHOUSE RACEWAY.
6. CONSTRUCT A NEW SIPHON INTAKE TO THE EASTSIDE CANAL.
7. CONSTRUCT DIVERSION RACEWAY TO THE WATER WHEEL.
8. CREST HEIGHT OF DAM DESIGNED TO PROVIDE WATER TO THE HASTINGS RANCH PUMP STATION.
9. CONSTRUCT SEDIMENT SLUICE STRUCTURES ON BOTH SIDES OF DAM.
10. CONSTRUCT UPSTREAM FISH PASSAGE CHANNEL.
11. CONSTRUCT DOWNSTREAM DEBRIS AND BOAT PASSAGE RAMP.
12. CONSTRUCT DOWNSTREAM FISH PASSAGE NOTCHES IN THE CREST OF THE DAM AND OUTFIT WITH PIT TAG DETECTORS; SEE SHEET C610 FOR TYPICAL PIT TAG DETECTOR SECTION.

LEGEND

- WS — EDGE OF WATER
- P/L — PROPERTY LINE
- IRR — UNDERGROUND IRRIGATION PIPELINE
- LOG BOOM



ALT 1 – DOWNSTREAM DIVERSION DAM – SITE PLAN (1/–)

SCALE: 1"= 50'

0" 50' 100'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _C100.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
155 E. 100 SOUTH, SUITE 205, PROVO, UT 84606
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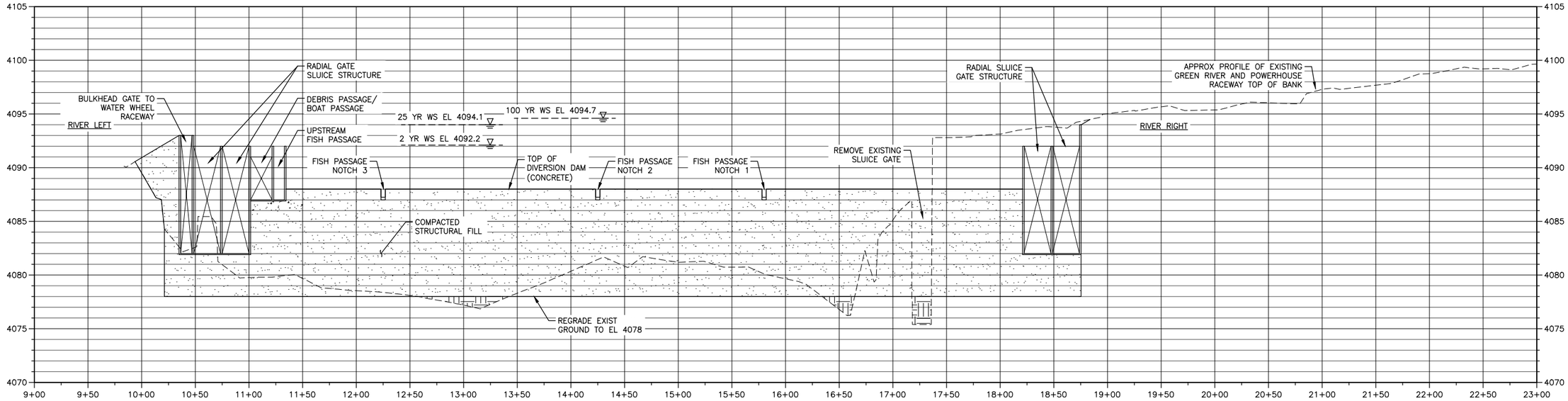
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 1 - DOWNSTREAM DIVERSION DAM
SITE PLAN

SHEET
C100

SHEET NOTES:

1. FOR FISH PASSAGE NOTCH AND PIT TAG DETAILS, SEE SHEET C610.
2. FOR BOAT PASSAGE DETAILS, SEE SHEET C700.



ALT 1 – DOWNSTREAM DIVERSION DAM PROFILE

SCALE: 1"= 50'H
1"= 5'V

0" 50' 100'
0" 5' 10'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _C101.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

NATURAL RESOURCES CONSERVATION SERVICE
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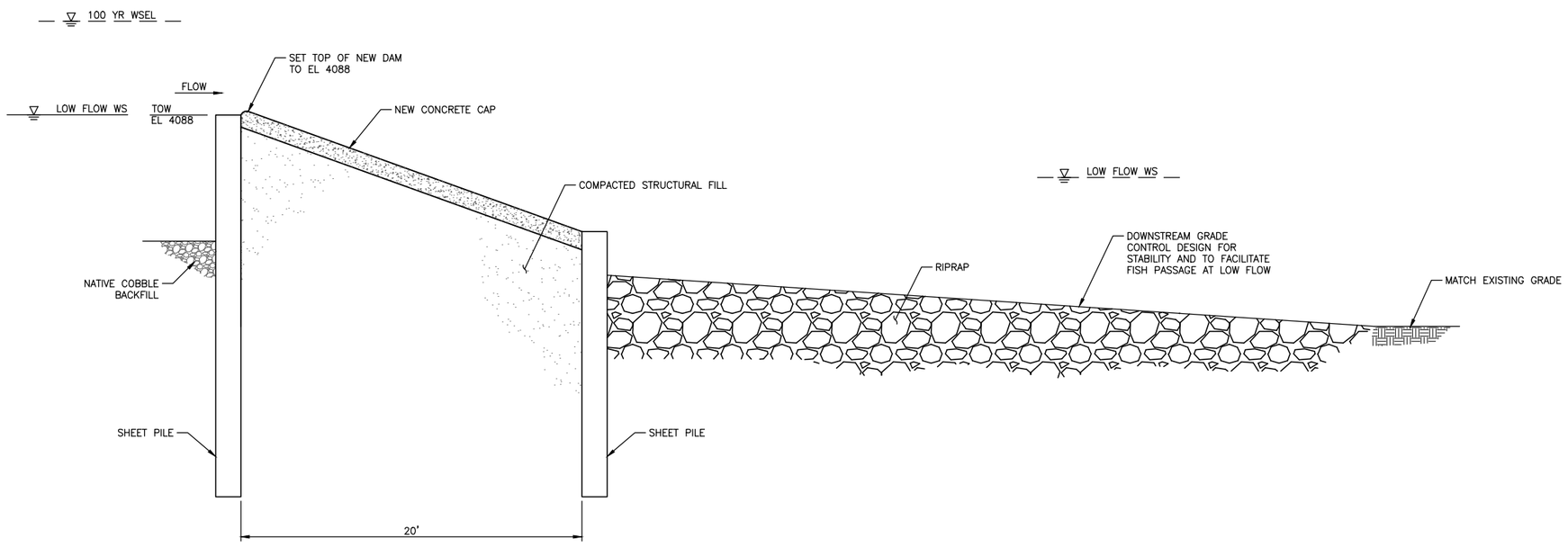
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 1 - DOWNSTREAM DIVERSION DAM PROFILE

SHEET
C101

SHEET NOTES:

1. NEW CONCRETE DIVERSION DAM TO BE CAST IN PLACE.
2. RIPRAP TO BE INSTALLED DOWNSTREAM OF DAM AND TO BE SIZED TO 18" TO 24".
3. RIPRAP APRON TO INCLUDE ROCK FILTER LAYERS AS NEEDED.
4. SHEET PILE SPECIFICATIONS DETERMINED IN ORDER TO MEET STABILITY CRITERIA.



ALT 1 – DOWNSTREAM DIVERSION DAM SECTION (A/C100)

SCALE: 1/4"= 1'-0" 0' 4' 8'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA

UDAF

DATE: 07 MARCH 2014
CAD FILENAME: _C102.DWG
CONTRACT NUMBER: AG-81243-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
155 EAST 460 SOUTH, SUITE 200 PO BOX 45033
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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 1 - DOWNSTREAM DIVERSION DAM SECTION

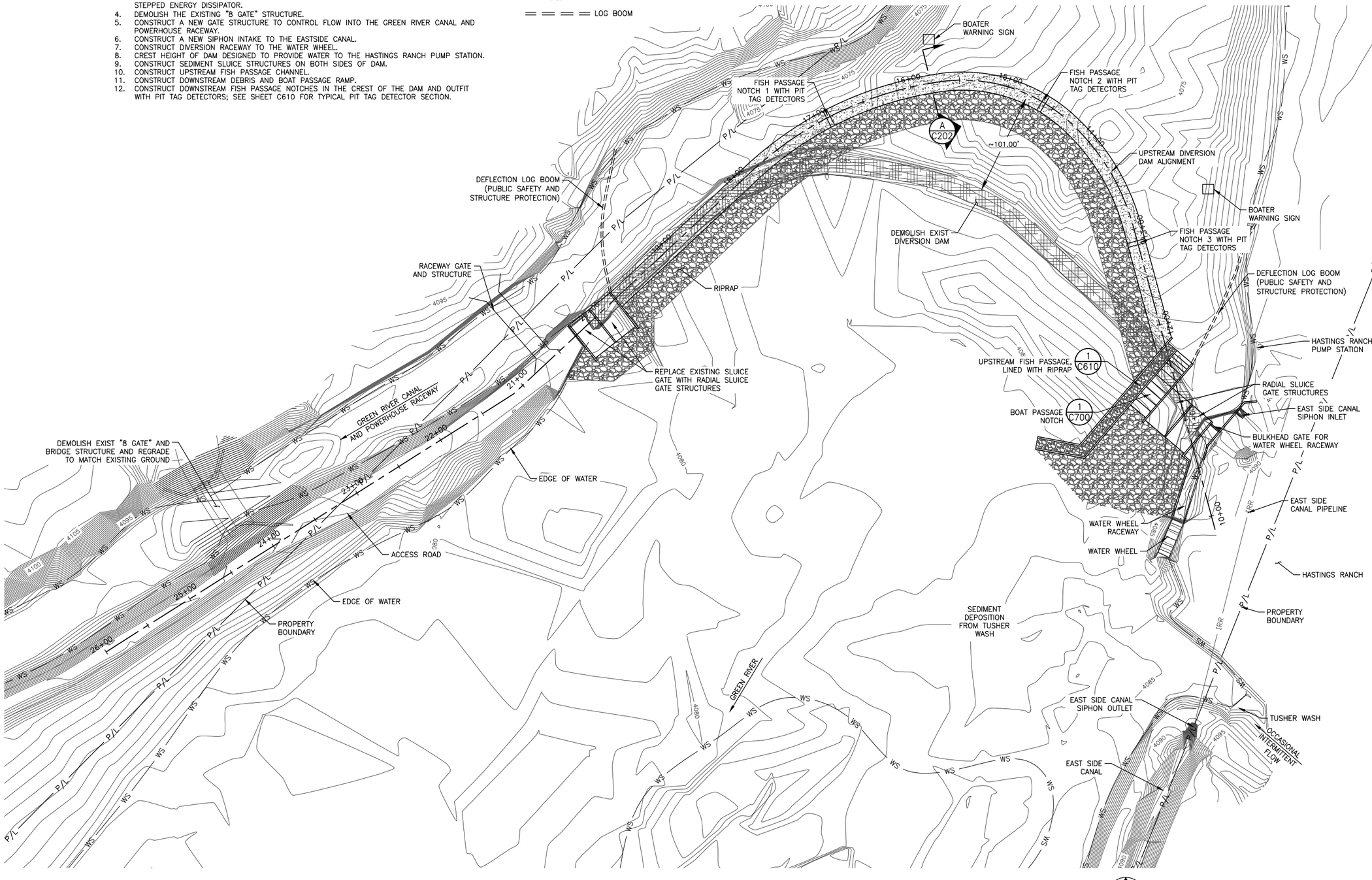
SHEET
C102

SHEET NOTES:

1. THIS ALTERNATIVE CONSISTS OF CONSTRUCTING THE DIVERSION DOWNSTREAM OF THE EXISTING DIVERSION STRUCTURE. THE ELEMENTS OF WORK ARE LISTED BELOW.
2. DEMOLISH THE EXISTING DIVERSION STRUCTURE.
3. CONSTRUCT A NEW STRUCTURE DOWNSTREAM OF THE EXISTING STRUCTURE. THE NEW STRUCTURE WILL CONSIST OF SHEET PILE AND CAST IN PLACE CONCRETE WEIR WITH A STEPPED ENERGY DISSIPATOR.
4. DEMOLISH THE EXISTING "8 GATE" STRUCTURE.
5. CONSTRUCT A NEW GATE STRUCTURE TO CONTROL FLOW INTO THE GREEN RIVER CANAL AND POWERHOUSE RACEWAY.
6. CONSTRUCT A NEW SIPHON INTAKE TO THE EASTSIDE CANAL.
7. CONSTRUCT DIVERSION RACEWAY TO THE WATER WHEEL.
8. CREST HEIGHT OF DAM DESIGNED TO PROVIDE WATER TO THE HASTINGS RANCH PUMP STATION.
9. CONSTRUCT SEDIMENT SLUICE STRUCTURES ON BOTH SIDES OF DAM.
10. CONSTRUCT UPSTREAM FISH PASSAGE CHANNEL.
11. CONSTRUCT DOWNSTREAM DEBRIS AND BOAT PASSAGE RAMP.
12. CONSTRUCT DOWNSTREAM FISH PASSAGE NOTCHES IN THE CREST OF THE DAM AND OUTFIT WITH PIT TAG DETECTORS; SEE SHEET C610 FOR TYPICAL PIT TAG DETECTOR SECTION.

LEGEND

WS — EDGE OF WATER
P/L — PROPERTY LINE
IRR — UNDERGROUND IRRIGATION PIPELINE
LOG BOOM



ALT 2 – UPSTREAM DIVERSION DAM – SITE PLAN

SCALE: 1"= 50'

0" 50' 100'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _C200.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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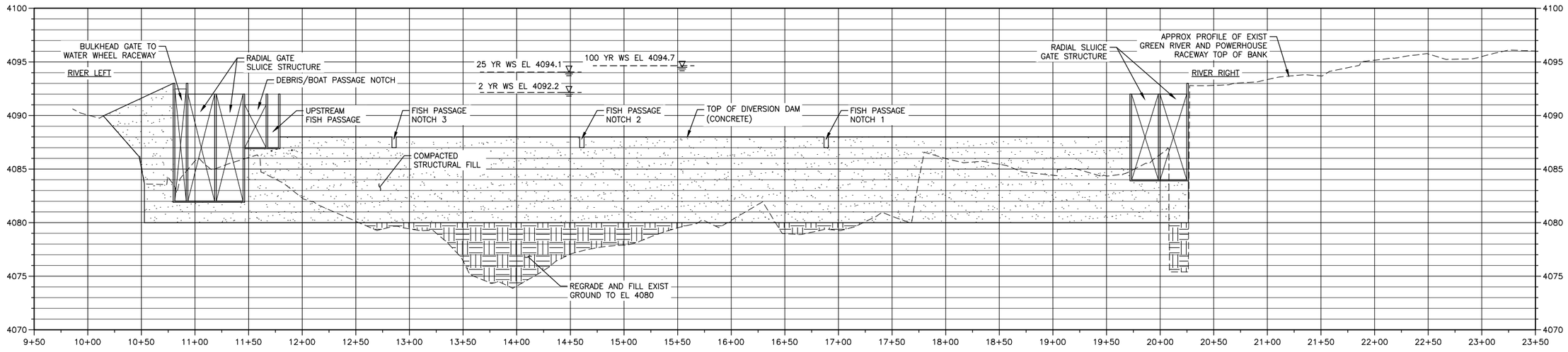
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 2 - UPSTREAM DIVERSION DAM
SITE PLAN

SHEET
C200

SHEET NOTES:

1. FOR FISH PASSAGE NOTCH AND PIT TAG DETAILS, SEE SHEET C610.
2. FOR BOAT PASSAGE DETAILS, SEE SHEET C700.
3. WATER SURFACE ELEVATIONS SHOWN ON THIS SHEET ARE APPROXIMATE AND ARE BASED ON HYDRAULIC MODEL RESULTS FOR ALTERNATIVE 1 – DOWNSTREAM DIVERSION DAM



ALT 2 – UPSTREAM DIVERSION DAM PROFILE

SCALE: 1"= 50'H
1"= 5'V

0" 50' 100'
0" 5' 10'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _C201.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

NATURAL RESOURCES CONSERVATION SERVICE
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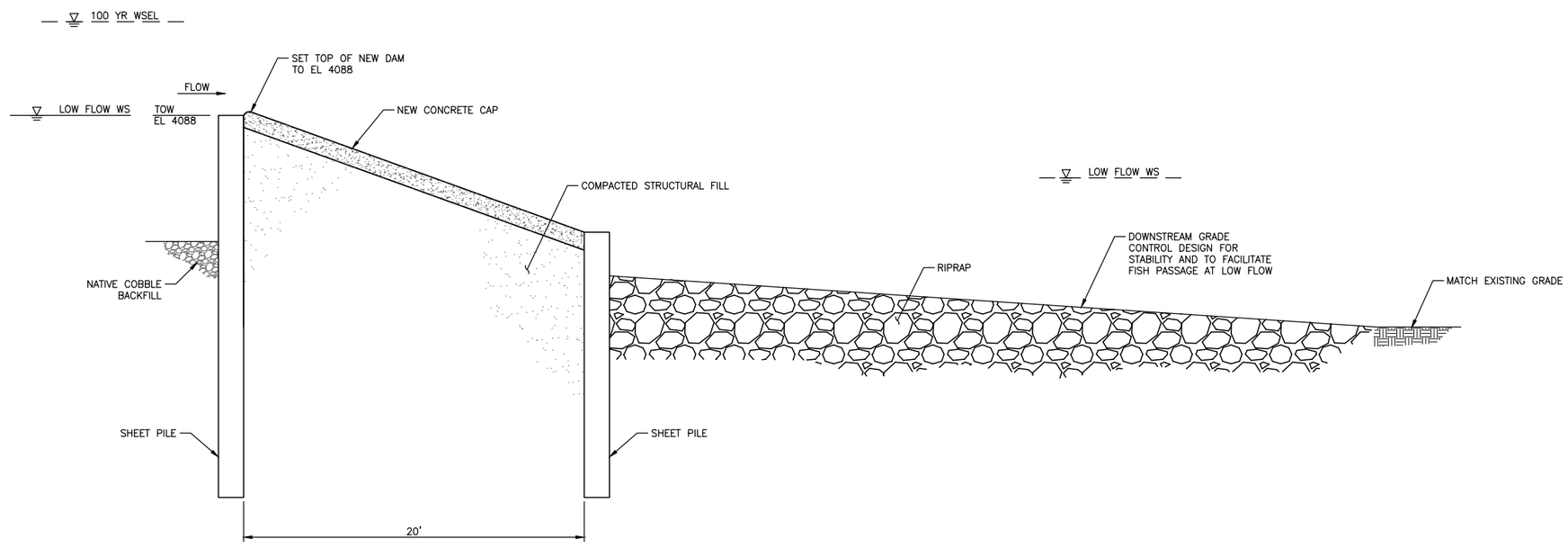
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 2 - UPSTREAM DIVERSION DAM PROFILE

SHEET
C201

SHEET NOTES:

1. NEW CONCRETE DIVERSION DAM TO BE CAST IN PLACE.
2. RIPRAP TO BE INSTALLED DOWNSTREAM OF DAM AND TO BE SIZED TO 18" TO 24".
3. RIPRAP APRON TO INCLUDE ROCK FILTER LAYERS AS NEEDED.
4. SHEET PILE SPECIFICATIONS DETERMINED IN ORDER TO MEET STABILITY CRITERIA.



ALT 2 – UPSTREAM DIVERSION DAM SECTION

SCALE: 1/4"= 1'-0"

A C200

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _C0X2.DWG
CONTRACT NUMBER: AG-81-043-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
125 SOUTH STATE STREET, ROOM 4450
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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 2 - UPSTREAM DIVERSION DAM SECTION

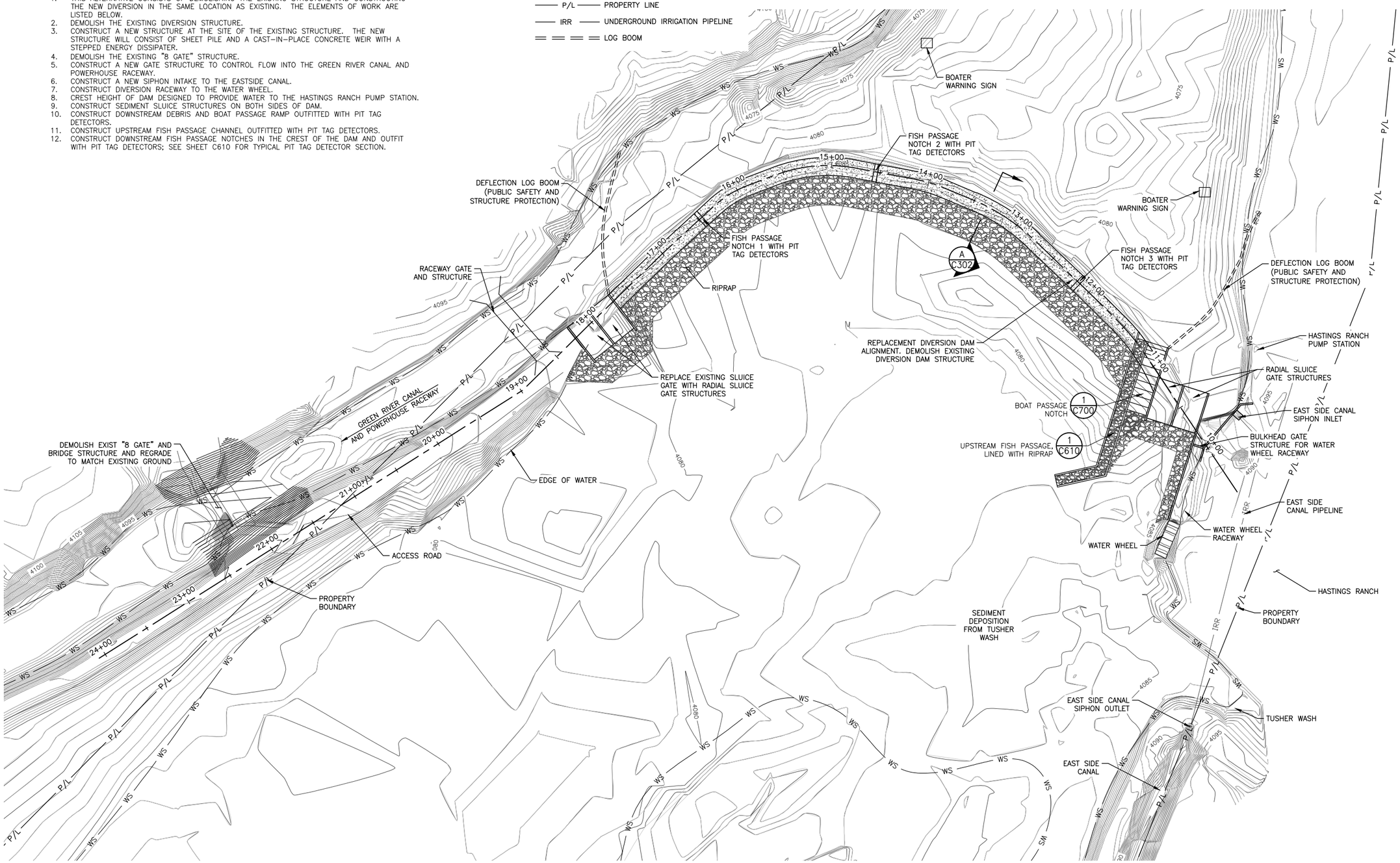
SHEET
C202

SHEET NOTES:

1. THIS ALTERNATIVE CONSISTS OF DEMOLISHING THE EXISTING STRUCTURE AND CONSTRUCTING THE NEW DIVERSION IN THE SAME LOCATION AS EXISTING. THE ELEMENTS OF WORK ARE LISTED BELOW.
2. DEMOLISH THE EXISTING DIVERSION STRUCTURE.
3. CONSTRUCT A NEW STRUCTURE AT THE SITE OF THE EXISTING STRUCTURE. THE NEW STRUCTURE WILL CONSIST OF SHEET PILE AND A CAST-IN-PLACE CONCRETE WEIR WITH A STEPPED ENERGY DISSIPATER.
4. DEMOLISH THE EXISTING "8 GATE" STRUCTURE.
5. CONSTRUCT A NEW GATE STRUCTURE TO CONTROL FLOW INTO THE GREEN RIVER CANAL AND POWERHOUSE RACEWAY.
6. CONSTRUCT A NEW SIPHON INTAKE TO THE EASTSIDE CANAL.
7. CONSTRUCT DIVERSION RACEWAY TO THE WATER WHEEL.
8. CREST HEIGHT OF DAM DESIGNED TO PROVIDE WATER TO THE HASTINGS RANCH PUMP STATION.
9. CONSTRUCT SEDIMENT SLUICE STRUCTURES ON BOTH SIDES OF DAM.
10. CONSTRUCT DOWNSTREAM DEBRIS AND BOAT PASSAGE RAMP OUTFITTED WITH PIT TAG DETECTORS.
11. CONSTRUCT UPSTREAM FISH PASSAGE CHANNEL OUTFITTED WITH PIT TAG DETECTORS.
12. CONSTRUCT DOWNSTREAM FISH PASSAGE NOTCHES IN THE CREST OF THE DAM AND OUTFIT WITH PIT TAG DETECTORS; SEE SHEET C610 FOR TYPICAL PIT TAG DETECTOR SECTION.

LEGEND

- WS — EDGE OF WATER
- P/L — PROPERTY LINE
- IRR — UNDERGROUND IRRIGATION PIPELINE
- LOG BOOM



ALT 3 – REPLACE EXISTING DIVERSION DAM – SITE PLAN

SCALE: 1"= 50'

0" 50' 100'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _C300.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

NATURAL RESOURCES CONSERVATION SERVICE
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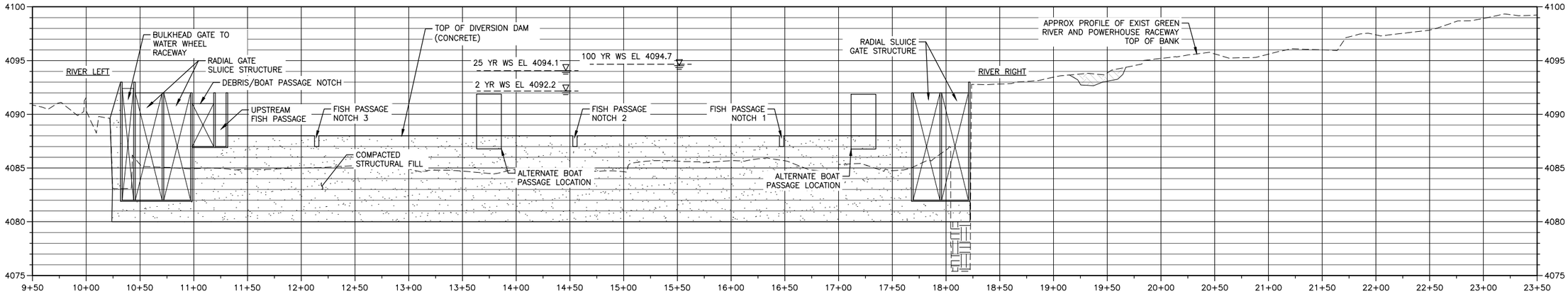
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 3 - REPLACE EXISTING DIVERSION DAM
SITE PLAN

SHEET
C300

SHEET NOTES:

1. FOR FISH PASSAGE NOTCH AND PIT TAG DETAILS, SEE SHEET C610.
2. FOR BOAT PASSAGE DETAILS, SEE SHEET C700.
3. WATER SURFACE ELEVATIONS SHOWN ON THIS SHEET ARE APPROXIMATE AND ARE BASED ON HYDRAULIC MODEL RESULTS FOR ALTERNATIVE 1 – DOWNSTREAM DIVERSION DAM



ALT 3 – REPLACE EXISTING DIVERSION DAM PROFILE

SCALE: 1"= 50'H (0" 50' 100')

1"= 5'V (0" 5' 10')

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA

UDAF

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS
DATE: 07 MARCH 2014
CAD FILENAME: _C301.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

NATURAL RESOURCES CONSERVATION SERVICE
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SALT LAKE CITY, UT 84138-1100

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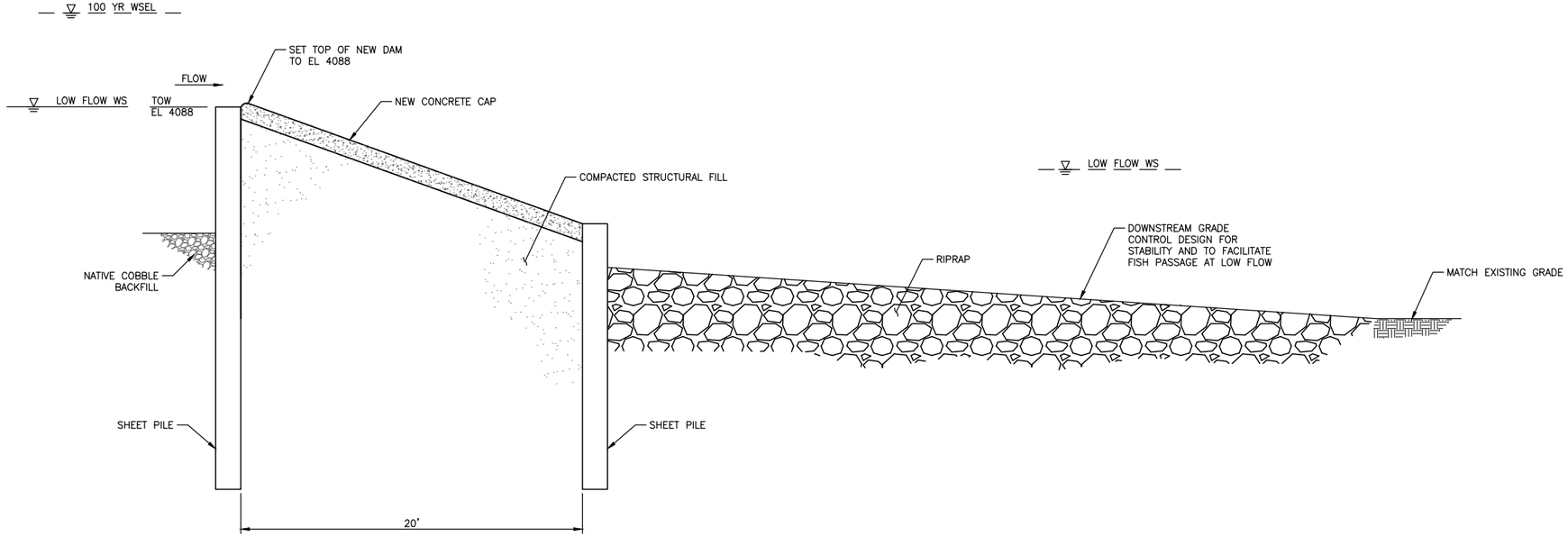
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 3 - REPLACE EXISTING DIVERSION DAM PROFILE

SHEET
C301

SHEET NOTES:

1. NEW CONCRETE DIVERSION DAM TO BE CAST IN PLACE.
2. RIPRAP TO BE INSTALLED DOWNSTREAM OF DAM AND TO BE SIZED TO 18" TO 24".
3. RIPRAP APRON TO INCLUDE ROCK FILTER LAYERS AS NEEDED.
4. SHEET PILE SPECIFICATIONS DETERMINED IN ORDER TO MEET STABILITY CRITERIA.



ALT 3 – REPLACE EXISTING DIVERSION DAM – SECTION (A / C300)

SCALE: 1/4"= 1'-0" 0' 4' 8'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA

UDAF

DATE: 07 MARCH 2014
CAD FILENAME: _C302.DWG
CONTRACT NUMBER: AG-81D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 3 - REPLACE EXISTING DIVERSION DAM SECTION

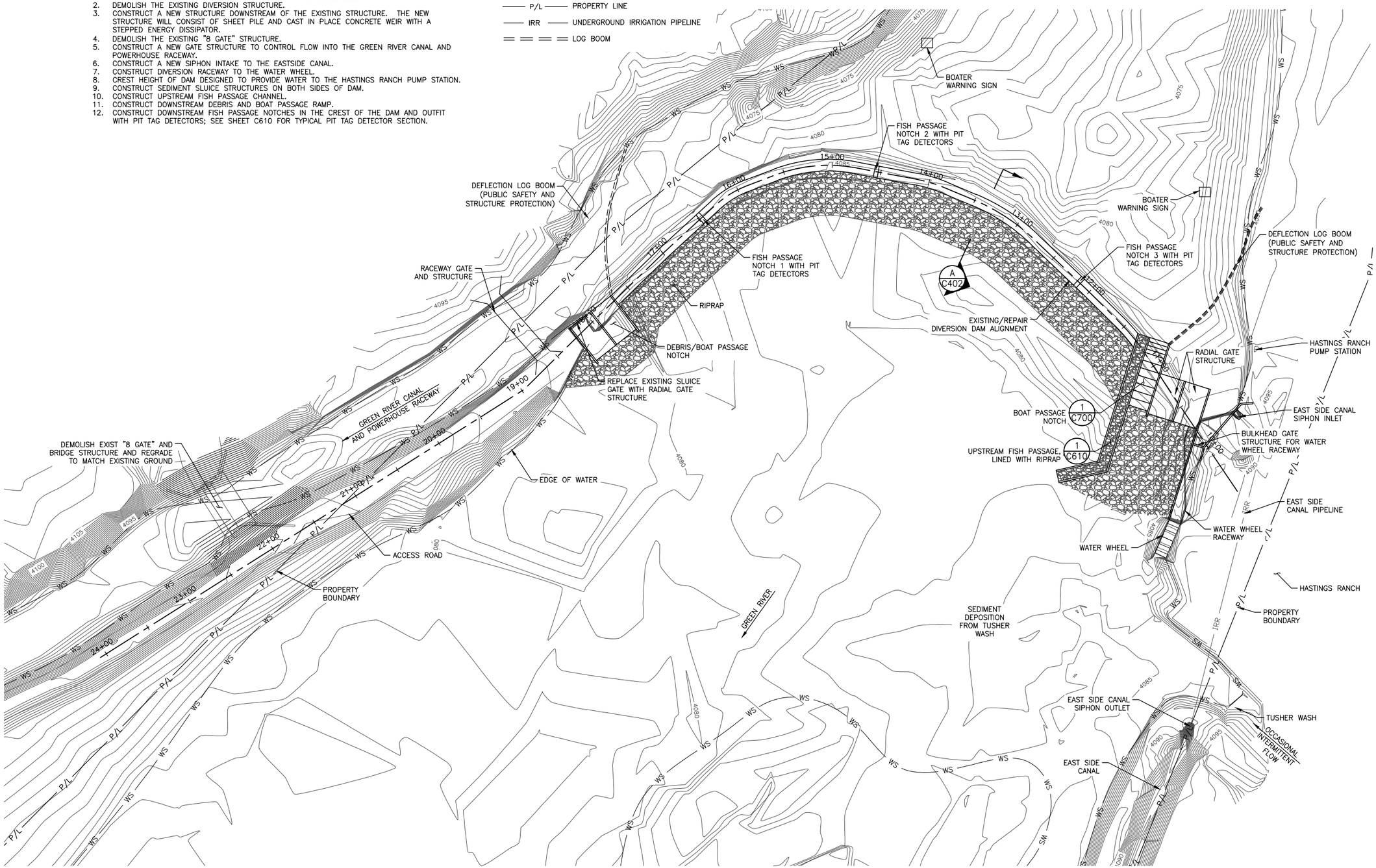
SHEET
C302

SHEET NOTES:

1. THIS ALTERNATIVE CONSISTS OF CONSTRUCTING THE DIVERSION DOWNSTREAM OF THE EXISTING DIVERSION STRUCTURE. THE ELEMENTS OF WORK ARE LISTED BELOW.
2. DEMOLISH THE EXISTING DIVERSION STRUCTURE.
3. CONSTRUCT A NEW STRUCTURE DOWNSTREAM OF THE EXISTING STRUCTURE. THE NEW STRUCTURE WILL CONSIST OF SHEET PILE AND CAST IN PLACE CONCRETE WEIR WITH A STEPPED ENERGY DISSIPATOR.
4. DEMOLISH THE EXISTING "8 GATE" STRUCTURE.
5. CONSTRUCT A NEW GATE STRUCTURE TO CONTROL FLOW INTO THE GREEN RIVER CANAL AND POWERHOUSE RACEWAY.
6. CONSTRUCT A NEW SIPHON INTAKE TO THE EASTSIDE CANAL.
7. CONSTRUCT DIVERSION RACEWAY TO THE WATER WHEEL.
8. CREST HEIGHT OF DAM DESIGNED TO PROVIDE WATER TO THE HASTINGS RANCH PUMP STATION.
9. CONSTRUCT SEDIMENT SLUICE STRUCTURES ON BOTH SIDES OF DAM.
10. CONSTRUCT UPSTREAM FISH PASSAGE CHANNEL.
11. CONSTRUCT DOWNSTREAM DEBRIS AND BOAT PASSAGE RAMP.
12. CONSTRUCT DOWNSTREAM FISH PASSAGE NOTCHES IN THE CREST OF THE DAM AND OUTFIT WITH PIT TAG DETECTORS; SEE SHEET C610 FOR TYPICAL PIT TAG DETECTOR SECTION.

LEGEND

- WS — EDGE OF WATER
- P/L — PROPERTY LINE
- IRR — UNDERGROUND IRRIGATION PIPELINE
- LOG BOOM



ALT 4 – REPAIR EXISTING DIVERSION DAM – SITE PLAN

SCALE: 1"= 40'

0" 40' 80'

1 / –

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _C400.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
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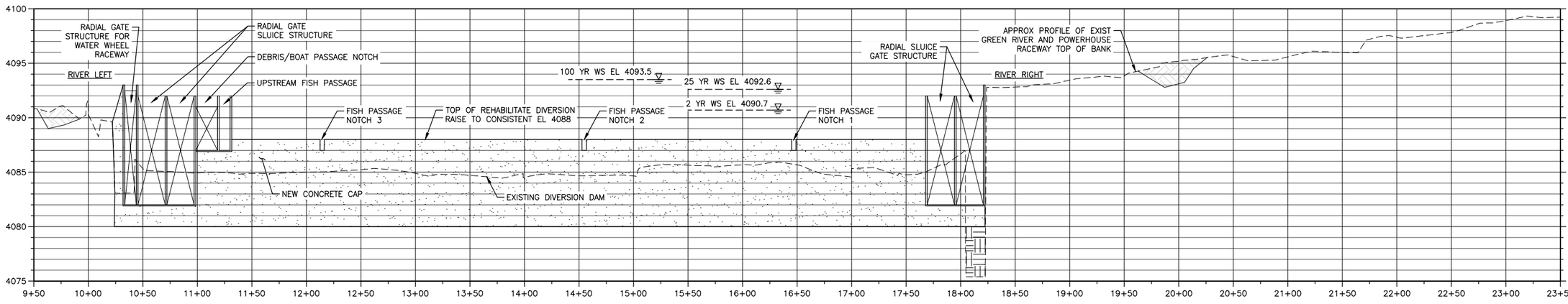
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 4 - REPAIR EXISTING DIVERSION DAM
SITE PLAN

SHEET
C400

SHEET NOTES:

1. FOR FISH PASSAGE NOTCH AND PIT TAG DETAILS, SEE SHEET C610.
2. FOR BOAT PASSAGE DETAILS, SEE SHEET C700.
3. WATER SURFACE ELEVATIONS SHOWN ON THIS SHEET ARE APPROXIMATE AND ARE BASED ON HYDRAULIC MODEL RESULTS FOR ALTERNATIVE 1 – DOWNSTREAM DIVERSION DAM



ALT 4 – REPAIR EXISTING DIVERSION DAM PROFILE

SCALE: 1"= 50'H

1"= 5'V

0" 50' 100'

0" 5' 10'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA

UDAF

DATE: 07 MARCH 2014
CAD FILENAME: _C401.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
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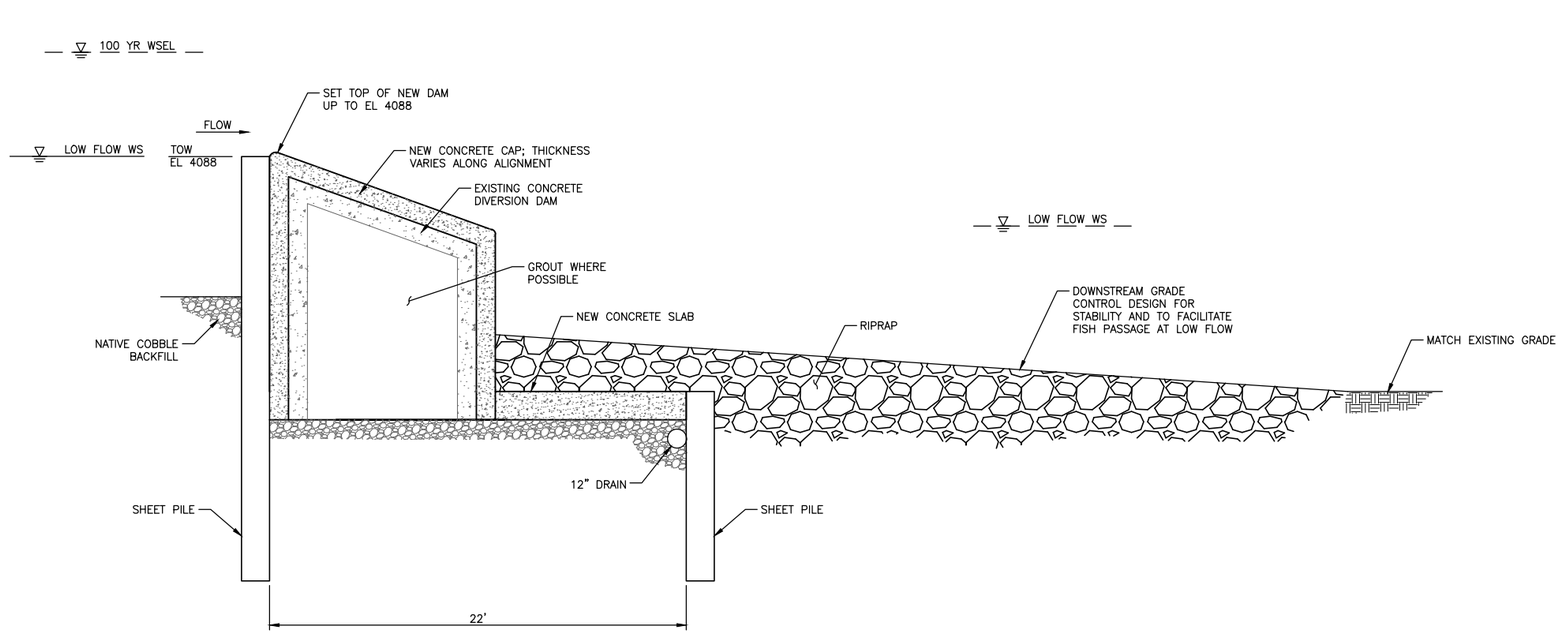
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 4 - REPAIR EXISTING DIVERSION
PROFILE

SHEET
C401

SHEET NOTES:

1. NEW CONCRETE DIVERSION DAM TO BE CAST IN PLACE.
2. RIPRAP TO BE INSTALLED DOWNSTREAM OF DAM AND TO BE SIZED TO 18" TO 24".
3. RIPRAP APRON TO INCLUDE ROCK FILTER LAYERS AS NEEDED.
4. SHEET PILE SPECIFICATIONS DETERMINED IN ORDER TO MEET STABILITY CRITERIA.



ALT 4 – REPAIR EXISTING DIVERSION DAM– SECTION (A C400)

SCALE: 1/4"= 1'-0"

0' 4' 8'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _CA02.DWG
CONTRACT NUMBER: AG-81243-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

NATURAL RESOURCES CONSERVATION SERVICE
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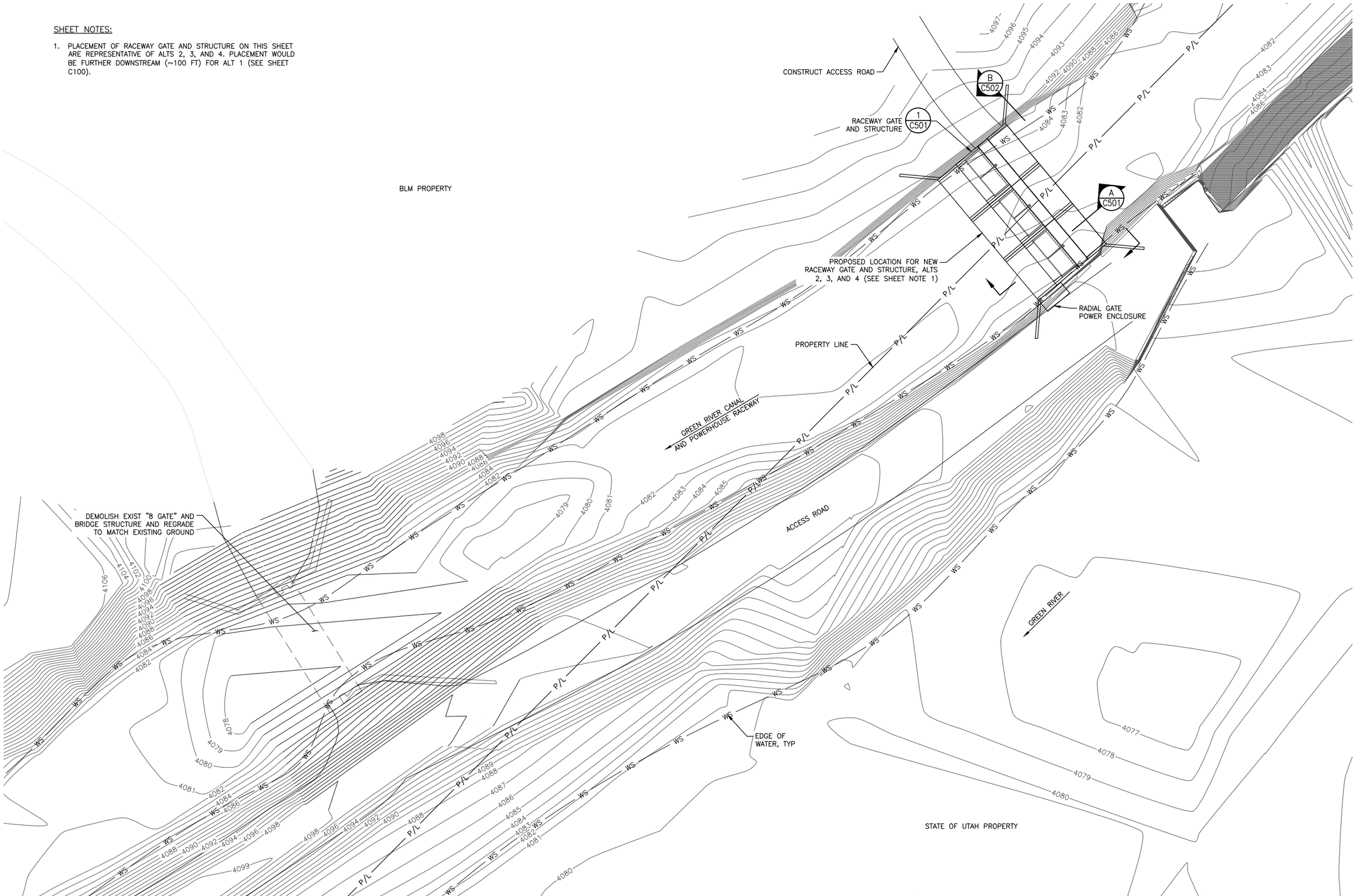
FAX: 208.342.4216

NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
ALT 4 - REPAIR EXISTING DIVERSION DAM
SECTION

SHEET
C402

SHEET NOTES:

1. PLACEMENT OF RACEWAY GATE AND STRUCTURE ON THIS SHEET ARE REPRESENTATIVE OF ALTS 2, 3, AND 4. PLACEMENT WOULD BE FURTHER DOWNSTREAM (~100 FT) FOR ALT 1 (SEE SHEET C100).



RACEWAY GATE AND STRUCTURE SITE PLAN

SCALE: 1"= 20'

0" 20' 40'

N

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DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

DATE: 07 MARCH 2014
CAD FILENAME: _C500.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

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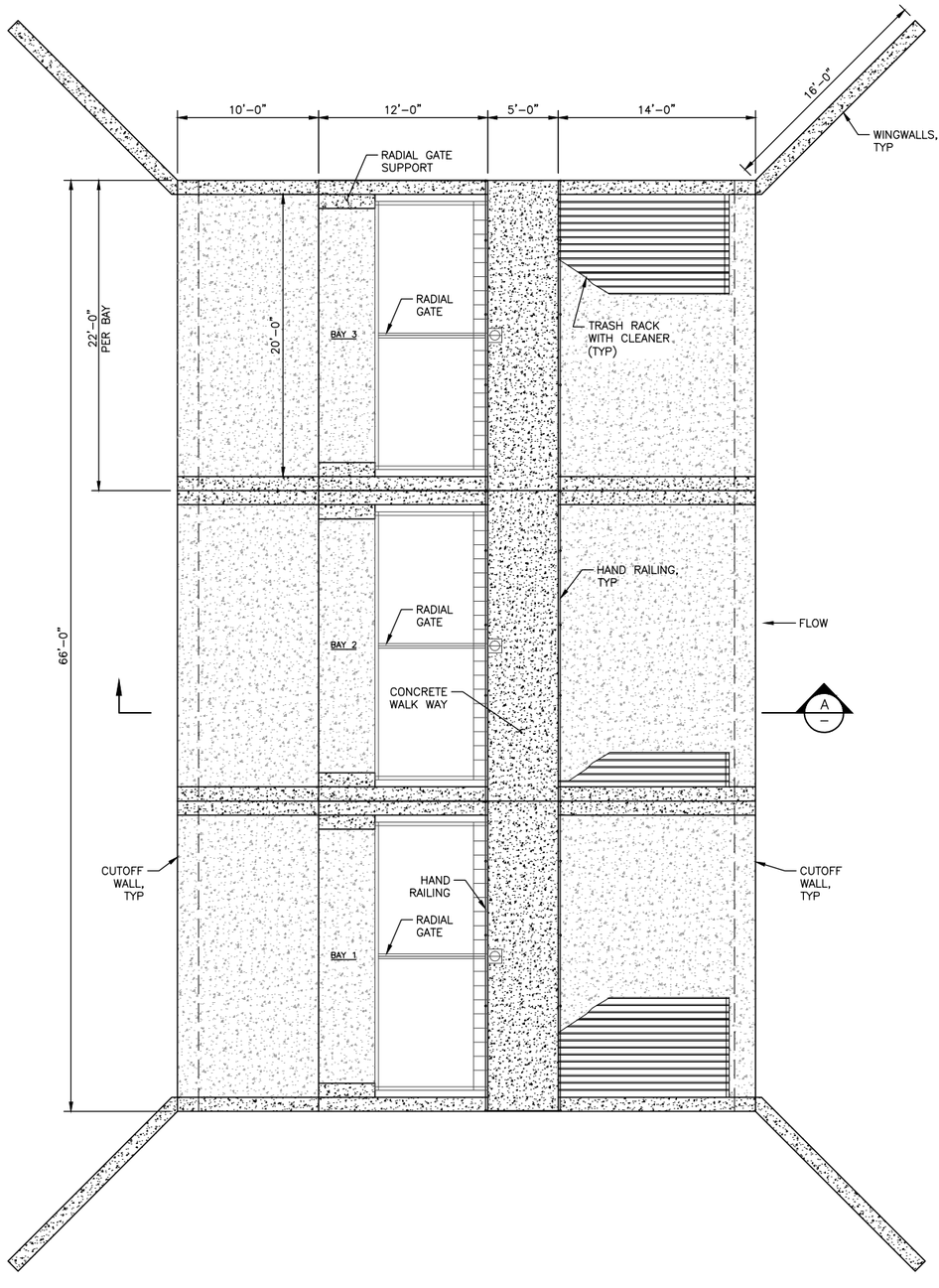
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
RACEWAY GATE AND STRUCTURE
SITE PLAN

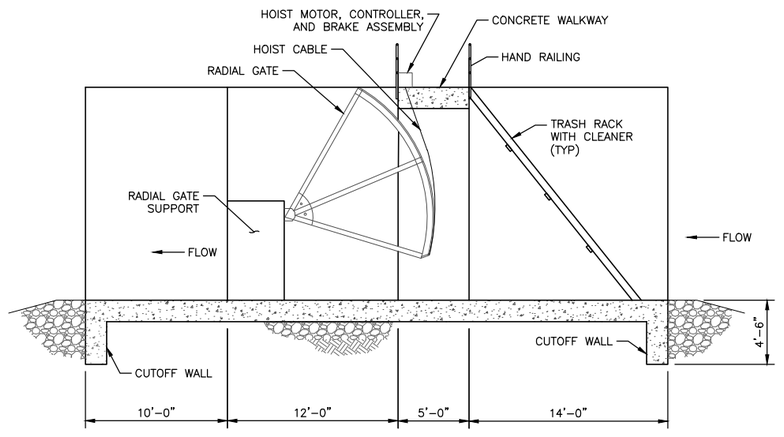
SHEET
C500



OUTLET STRUCTURE WITH RADIAL GATE

SCALE: NTS

1 C500



SECTION

SCALE: NTS

A C500

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA

UDAF

DATE: 07 MARCH 2014
CAD FILENAME: _C501.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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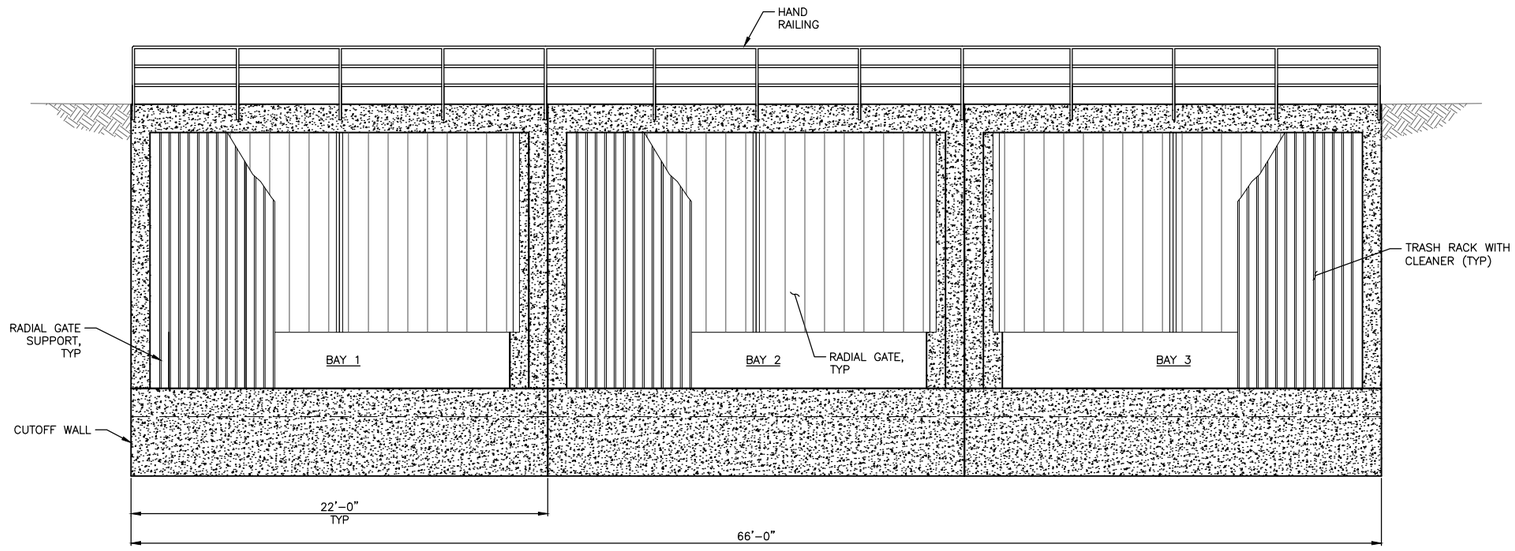
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
RACEWAY GATE AND STRUCTURE
SECTIONS AND DETAILS

SHEET
C501



SECTION

SCALE: NTS

B
C500

FINAL CONCEPT DESIGN
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DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

DATE: 07 MARCH 2014
CAD FILENAME: _C502.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

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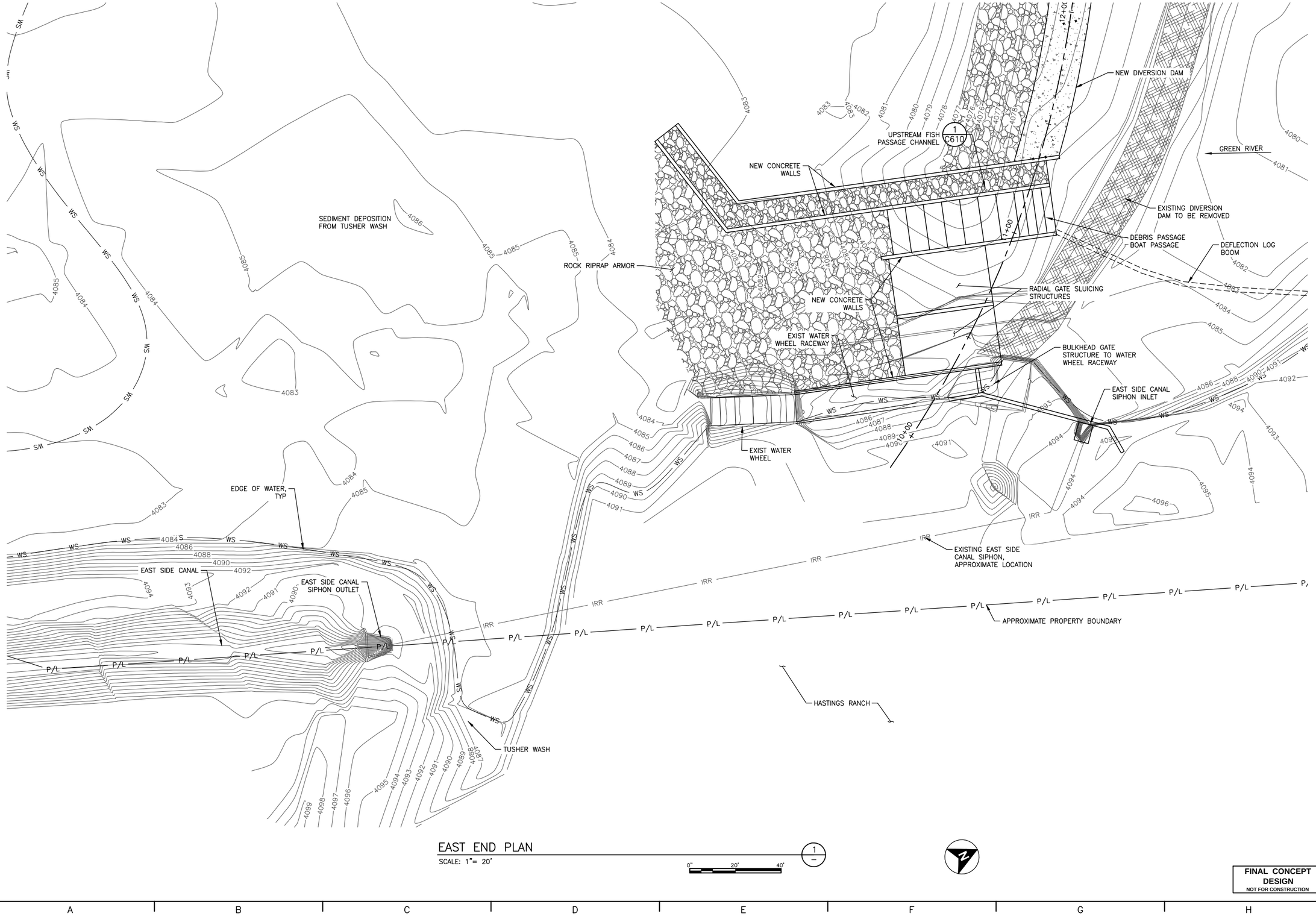
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
RACEWAY GATE AND STRUCTURE SECTIONS

SHEET
C502



EAST END PLAN

SCALE: 1" = 20'

1

0" 20' 40'

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

DATE: 07 MARCH 2014
CAD FILENAME: _C600.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

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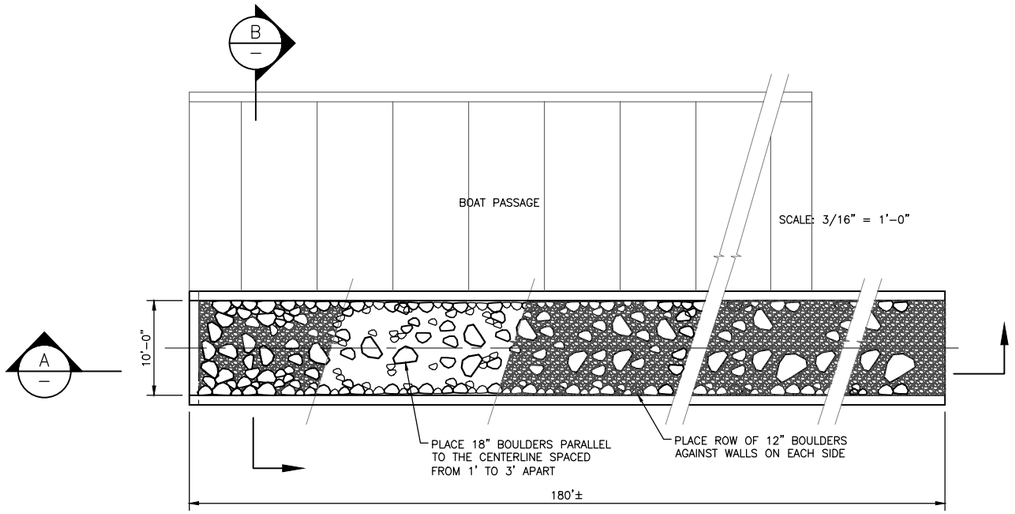
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
EAST END PLAN

SHEET
C600

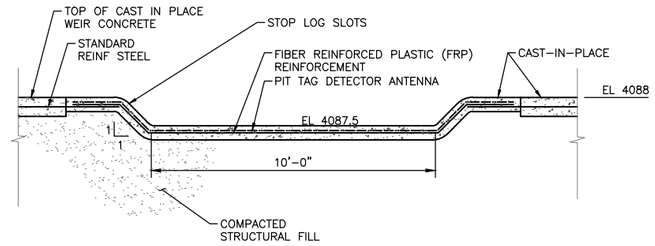


UPSTREAM FISH PASSAGE PLAN

SCALE: 1/8" = 1'-0"

0' 8' 16'

1 C100

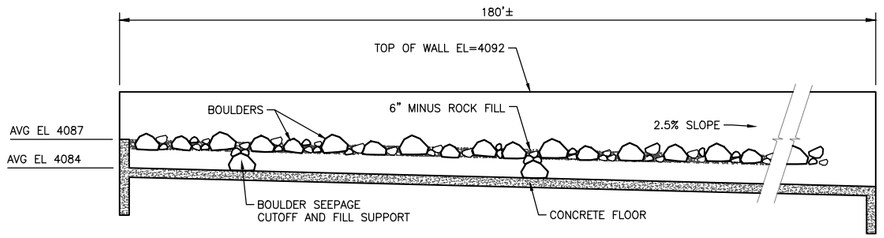


TYPICAL DOWNSTREAM FISH PASSAGE SECTION

SCALE: 3/8" = 1'-0"

0' 2' 4'

2 C100

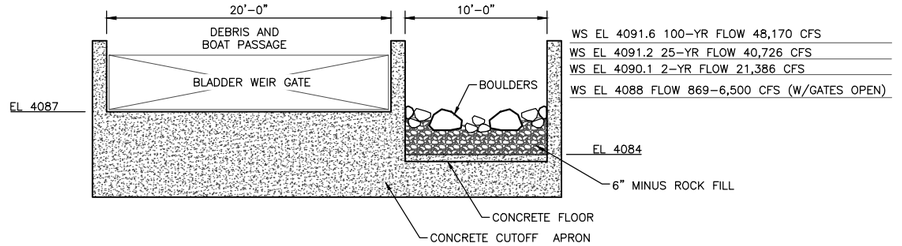


SECTION

SCALE: 1/8" = 1'-0"

0' 8' 16'

A —



SECTION

SCALE: 3/16" = 1'-0"

0' 4' 8'

B —

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA
UDAF

DATE: 07 MARCH 2014
CAD FILENAME: _C610.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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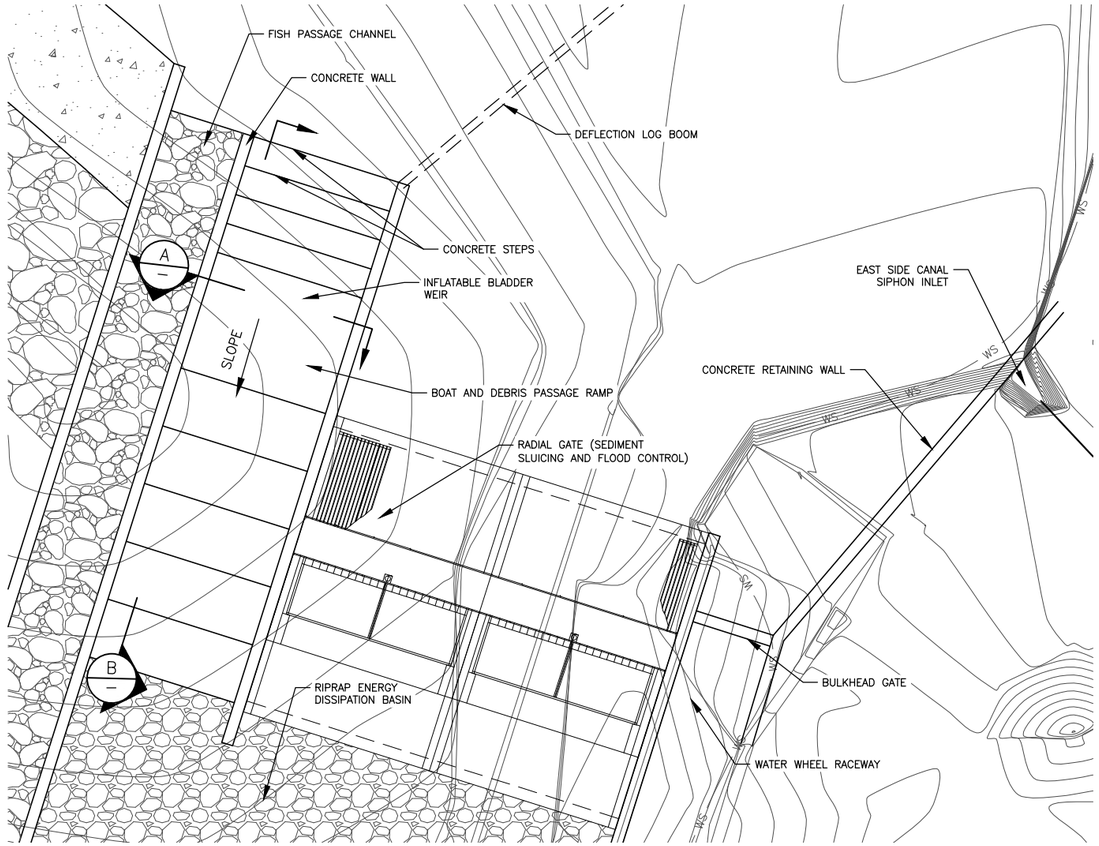
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
FISH PASSAGE STRUCTURE
PLAN AND SECTIONS

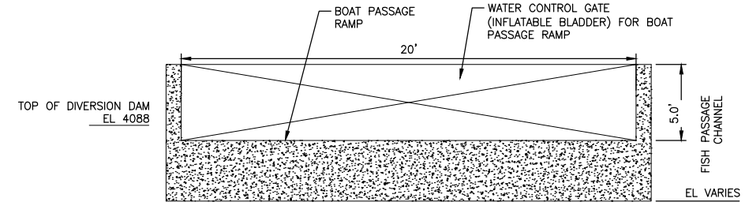
SHEET
C610



BOAT PASSAGE PLAN

SCALE: 1"=10'

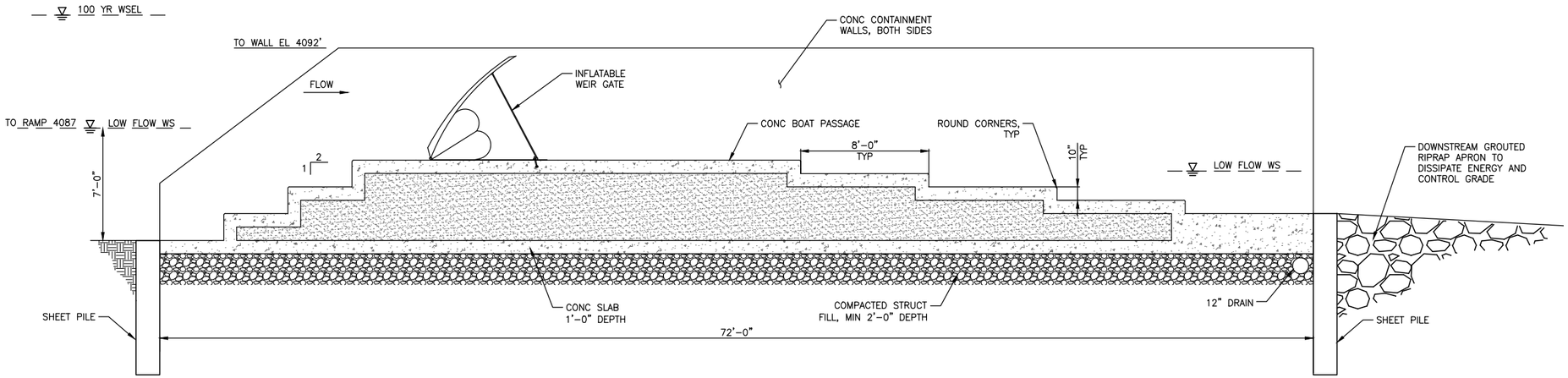
1 / GC100



BOAT PASSAGE SECTION

SCALE: 1"=5'

A



BOAT PASSAGE SECTION

SCALE: 1/4"= 1'-0"

B

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

USDA NRCS

DATE: 07 MARCH 2014
CAD FILENAME: _C700.DWG
CONTRACT NUMBER: AG-8D43-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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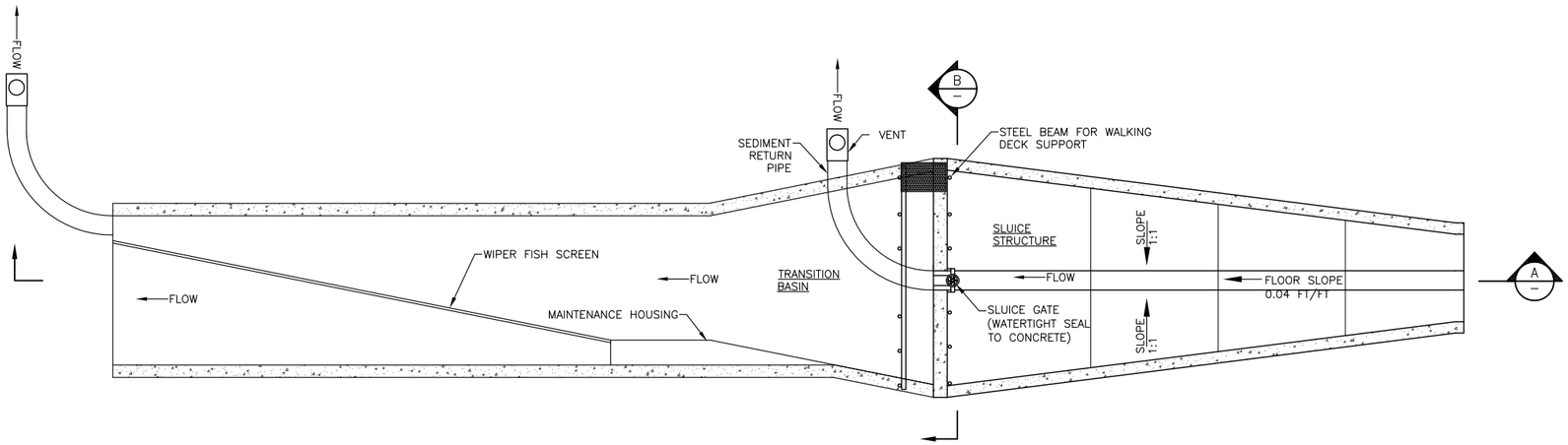
NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
BOAT PASSAGE STRUCTURE
PLAN AND SECTIONS

SHEET
C700



SHEET KEY NOTES:

A TOP OF WALLS

B TOP OF FLOOR

C TOP OF FLOOR

D CREST OF WEIR

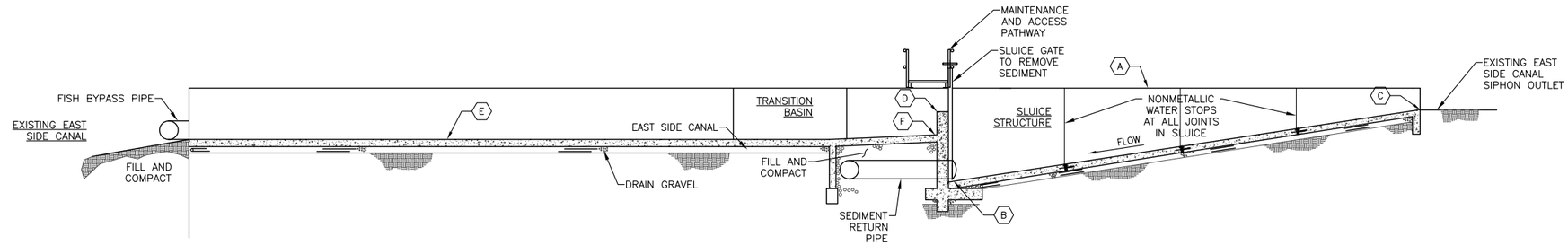
E BASIN FLOOR

F BASIN FLOOR

BOAT PASSAGE PLAN

SCALE: NTS

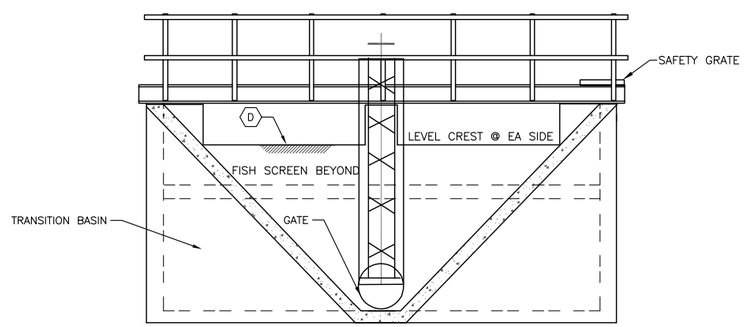
1 GC107



SECTION

SCALE: NTS

A



SECTION

SCALE: NTS

B

FINAL CONCEPT DESIGN
NOT FOR CONSTRUCTION

DATE: 07 MARCH 2014
CAD FILENAME: _C800.DWG
CONTRACT NUMBER: AG-8043-D-12-0020

DESIGNED BY: K. JENSEN
DRAWN BY: J. LAHMON
CHECKED BY: D. AXNESS
SUBMITTED BY: D. AXNESS

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125 SOUTH STATE STREET, ROOM 4010
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NRCS AND UDAF
GREEN RIVER DIVERSION REHABILITATION
GRAND AND EMERY COUNTIES, UTAH
GREEN RIVER
EAST SIDE SLUICE / FISH BARRIER STRUCTURE

SHEET
C800

MCMILLEN, LLC

To:		Project:	NRCS Green River EWP, Grand and Emory Counties, Utah
From:	Dan Axness	Cc:	File
Date:	March 4, 2014	Contract No:	AG-8D43-D-12-0020
Subject:	NRCS Green River Diversion Dam Rehabilitation Hydrology Technical Memo		

1.0 INTRODUCTION

The following technical memo is intended to present the hydrological analyses conducted for the Natural Resources Conservation Service (NRCS) Green River Diversion Dam Rehabilitation Concept Design Project. The memo discusses the regulated and unregulated hydrology observed at the Green River Diversion Structure, the competing water demands associated with the project, and the likelihood of the project meeting these competing demands.

2.0 GREEN RIVER HYDROLOGY

Flaming Gorge Dam was completed in 1965, after which flows in the Green River were regulated due to water storage in Flaming Gorge Reservoir. Peak discharges above the Green River Diversion Dam were therefore estimated using the HEC-SSP program (USACE 2010) for the years 1965 through 2009. HEC-SSP applies the methods outlined in Bulletin #17B (USGS 1982) to a time series of flow data in order to calculate the discharge for various annual return periods. Results are given in Table 1 for the 2-, 25-, 50-, and 100-yr events. Results in the table are similar to results published elsewhere (cf. Gerner et al. 2006).

Table 1. Green River Peak Discharges for Various Return Periods, Estimated Using StreamStats and HEC-SSP

Return Period	Discharge
2-Yr	21,386
25-Yr	40,726
50-Yr	44,603
100-Yr	48,170

Instantaneous flood frequencies were also calculated for each month using flow data obtained from USGS gaging station 09315000 at Green River, UT. Results are given in Table 2 below. From the table, the hydrograph in the Green River basin appears to have two peaks (bimodal). One peak occurs in the late Fall when the area experiences frequent rainfall events, while the other, larger peak occurs in the Spring, when snowpack begins to melt. Results also show that the largest flows occur in June, when 1% of flows will be greater than 41,530 cfs.

Table 2. Instantaneous Flood Frequencies by Month for the Green River at USGS Gaging Station 09315000

		% of Flows Less Than					
Discharge (cfs)	**Month**	**1**	**5**	**10**	**50**	**95**	**99**
	January	916	1,312	1,633	2,924	5,189	6,162
	February	1,253	1,648	1,853	3,094	6,058	8,144
	March	2,000	2,243	2,485	4,052	8,361	10,905
	April	2,352	2,719	2,985	5,272	12,585	16,030
	May	3,340	4,055	5,032	11,505	24,903	34,562
	June	1,703	3,038	4,020	13,907	32,475	41,530
	July	907	1,363	1,619	4,205	16,315	32,681
	August	764	1,139	1,327	2,884	6,938	9,983
	September	1,022	1,228	1,395	2,628	5,068	6,743
	October	1,307	1,479	1,703	3,023	7,068	7,976
	November	1,532	1,729	1,866	3,228	6,367	7,087
	December	939	1,260	1,441	2,810	5,824	6,452

The flood frequencies presented in Table 2 are reported for the years 1964-2012 and are indicative of the flood frequencies seen at the project site for medium to high flows. However, they are not representative of the frequency of low flows. In April of 2006, a Record of Decision (ROD) was filed for a Final Environmental Impact Statement (FEIS) that proposed operational changes to Flaming Gorge Dam that would, among other things, regulate the amount of water flowing through "Reach 3" of the Green River, which includes the Green River Diversion (USBR 2006). Specifically, the FEIS recommends a minimum flow through "Reach 3" of 1,300 cfs in dry years (±40%), with successively higher minimum thresholds in wetter years. Because the implementation of the FEIS is assumed to dictate flows in the Green River, flow data analyzed here are restricted to the past eight years, after the ROD was filed in 2006.

The overall demand to be met at the Green River Diversion includes water allocation for water rights holders, fish bypass in the hydropower raceway or Green River Canal, sediment sluicing, boat passage, upstream fish passage, and downstream fish passage. The estimated demand from perfected water rights at the Green River Diversion is 819 cfs, as detailed in Table 3 below.

Table 3. Perfected Water Rights at the Green River Diversion

Water Right	License No.	Priority Date	CFS	Use
Chris Dunham, Howard Hastings, Clark Ross	92-74	1/1/1879	5	Irrigation
East Side Irrigation Company	92-4	2/8/1906	6	Irrigation
Chris Dunham, Howard Hastings, Clark Ross	92-43	7/29/1912	60	Hydropower Plant
Bruce and Dorothy Nelson	92-21	5/16/1932	2	Irrigation
Lee Thayn	91-113	12375	35	Irrigation
Green River Canal Company	91-294	6/18/1952	60	Irrigation, Stockwater and Domestic
Eastside High Ditch Irrigation Company	92-622	8/7/1958	5	Irrigation
Eastside High Ditch Irrigation Company	92-633	8/7/1958	7	Irrigation
Gunnison Butte Mutual Irrigation Company	91-5075	8/7/1958	4	Irrigation
Gunnison Butte Mutual Irrigation Company	92-638	8/7/1958	11	Irrigation
Lee Thayn	91-4130	11/25/1974	600	Hydropower Plant
Lee Thayn	91-5161	8/7/1985	4	Irrigation
Green River Canal Company	91-5043	11/3/2000	20	Sluice Canal and Raceway
Total			**819**	

A conservative estimate of the water demands for fish bypass in the hydropower raceway or the Green River Canal is 30 cfs. Assuming that a boat passageway only requires 1 foot of depth for safe passage, and that the ramp can be as long as 80 feet, the allocation required for the boat passage structure is 147 cfs. Assuming a trapezoidal fishway with channel width of 10 feet, a 40:1 channel slope (2.5%), and a Manning's roughness coefficient of 0.07, the water allocation required to allow upstream fish passage would be 30 cfs. Assuming a weir coefficient of 2.67 over the crest of the diversion structure, the required flow rate for three 10-foot wide notches spread out across the dam is 40 cfs. The total water demand at the diversion structure is therefore 1,066 cfs (see Table 4 below).

Table 4. Water Demands at the Green River Diversion Structure

Use	Demand (cfs)
Water Rights Holders	819
Fish Bypass	30
Boat Passage	147
Upstream Fish Passage	30
Downstream Fish Passage	40
TOTAL	**1,066**

Flow rates during the growing season from April 1 through October 31 at USGS Gage 09315000 at Green River, UT and at USGS Gage 09261000 near Jensen, UT are depicted in Figure 1 below. Only flows during the growing season are shown because the growing season represents the time period during which irrigation, fish migration and boat passage all take place. The figure also shows the base flow recommended in "Reach 3" by the FEIS during dry years (1,300 cfs), along with the combined demand at the diversion structure (1,066 cfs) for comparison. From the figure, the recommended base flow of 1,300 cfs was not met on a total of fifteen days since April, 2006. However, the flows at the diversion structure required to meet the demands associated with this project (1,066 cfs) have been met every day since the ROD went into effect in 2006.

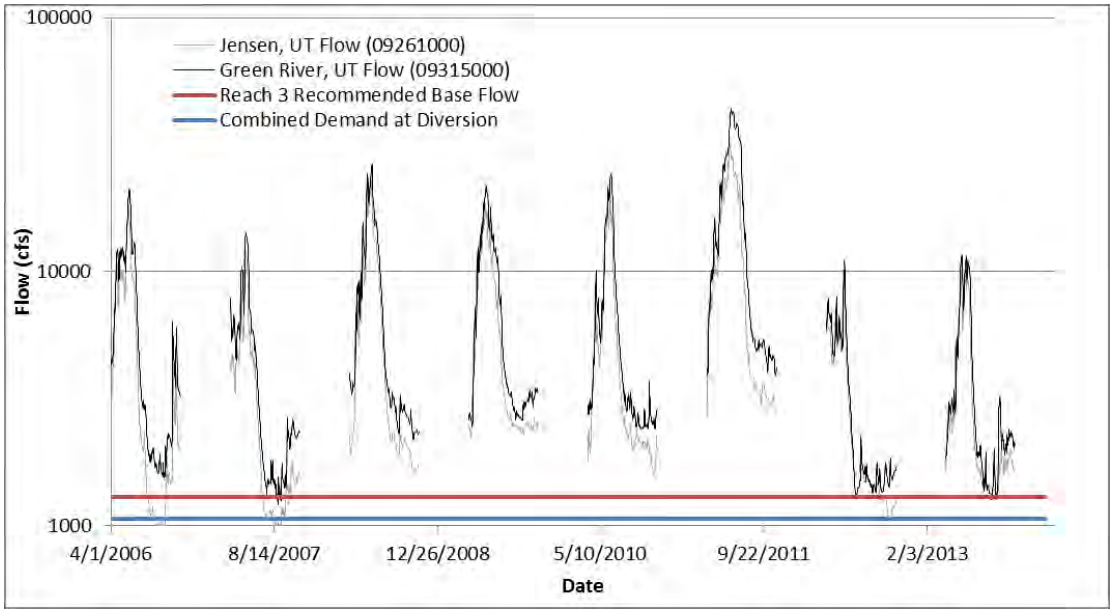


Figure 1. Flow Rates at USGS Gage 09315000 at Green River, UT since the Record of Decision

Figure 1 also indicates a relationship between flows near Jensen, UT and flows at Green River, UT, such that peaks and troughs in the hydrograph of each gage correspond fairly well. This is further evidenced by Figure 2 below, which shows the flow at Green River, UT as a function of the flow near Jensen, UT during the growing season since 2006. This relationship is important because the flows in "Reach 2" (i.e. near Jensen, UT) are the first priority laid out in the FEIS. Additionally, baseflows in "Reach 2" are allowed to fluctuate by ±40%. Thus, the 900 cfs minimum threshold in "Reach 2" in dry years could translate to an actual minimum flow of 540 cfs near Jensen, UT. It is therefore of interest what this effective low flow near Jensen would translate to at the diversion structure. From the regression equation given in Figure 2, 540 cfs corresponds to a flow rate of 1,132 cfs at the Green River Diversion Structure. This flow rate is still larger than the 1,066 cfs demand of the present project. However, it should be stressed that, although the regression relationship given in the figure is strong (R2=0.93), the possibility exists that flows at the diversion structure could fall below the demand of 1,066 cfs, should flows in "Reach 2" reach -40% of their baseflow target in dry years. However, such a possibility does seem unlikely, given the record of flows since the ROD was implemented in 2006 and the large fraction of regulated flow evident at low flows.

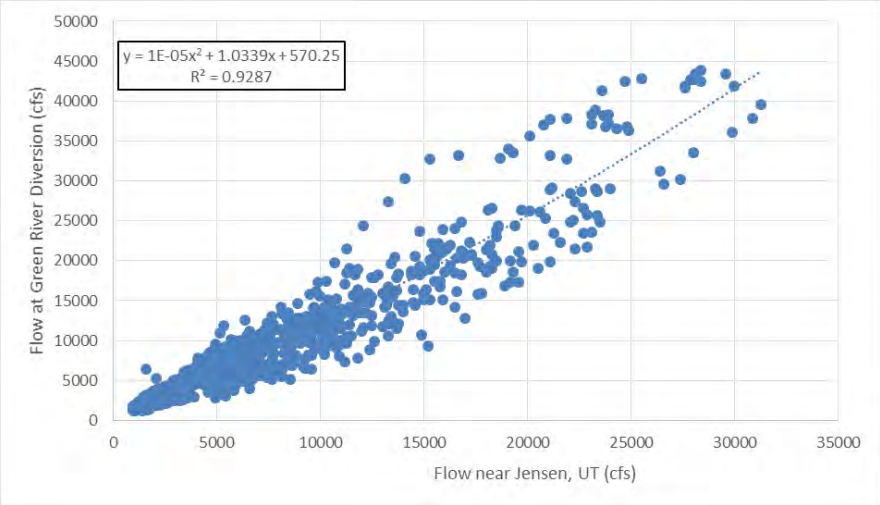


Figure 2. Green River Flow Rates at Green River, UT as a Function of Flows near Jensen, UT

3.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analyses described in this memo, the minimum flow expected at the Green River Diversion structure is 1,132 cfs, assuming flows near Jensen, UT are 40% below the minimum target baseflow in dry years and the functional relationship between flows near Jensen and flows at Green River during the growing season is valid. The present design of the rehabilitation project requires 1,066 cfs to meet the competing demands of the project, and includes flows for boat passage, upstream and downstream fish passage, irrigation, hydropower and sediment sluicing.

Therefore, it appears very likely that all water demands associated with this project will be met, provided that changes in hydrology due to land use change and/or climate change are negligible, and that operation of Flaming Gorge Dam continues to adequately meet the minimum baseflows outlined in the FEIS of 2006.

4.0 REFERENCES

Gerner, S.J., Spangler, L.E., Kimball, B.A., Wilberg, D.D., and Naftz, D.L., 2006. "Hydrology and Water Quality in the Green River and Surrounding Agricultural Areas near Green River in Emery and Grand Counties, Utah, 2004-05", U.S. Geological Survey Scientific Investigations Report 2006-5186.

U.S. Bureau of Reclamation (USBR), 2006. "Record of Decision, Operation of Flaming Gorge Dam, Final Environmental Impact Statement", USBR Upper Colorado Region, February, 2006.

U.S. Geologic Survey (USGS), 1982. "Guidelines for Determining Flood Flow Frequency", Bulletin #17B of the Hydrology Subcommittee, Interagency Advisory Committee on Water Data.

APPENDIX C – SUPPORTING DOCUMENTATION

NRCS Green River Diversion Dam Damage Survey Report

Water Resources – Water Rights

BLM Plant Survey Memo

Preliminary Waters of the US Inventory Memo

DAMAGE SURVEY REPORT (DSR)
Emergency Watershed Protection Program – Recovery

Section 1A

Date of Report: **1/23/2012**

DSR Number: **Gr. Rvr. Diverson, Berm, bank stabilization.**

Project Number: **Green River River channel**

NRCS Entry Only				
Eligible:	YES	**X**	NO	
Approved:	YES	**X**	NO	
Funding Priority Number (from Section 4)		**3-abef**		
Limited Resource Area:	YES		NO	**X**

Section 1B Sponsor Information

Sponsor Name: **Utah Dept Ag Food**

Contact: **Ron Davidson (UDAF) ; Chris Dunham, GRCD, 435-820-8202**

Address: **350 N Redwood Road**
PO Box 146500

City/State/Zip: **Salt Lake City, Utah 84114-6500**

Telephone Number: **801- 538 -7100** Fax: **801-538-7126**

Section 1C Site Location Information

County: **Emery/Grand** State: **Utah** Congressional District: **II**

Latitude: _____ Longitude: _____ Section: **NE 3** Township: **21S** Range: **16E**
Latitude: _____ Longitude: _____ Section: **NW 28** Township: **20S** Range: **16E**
UTM Coordinates: _____ **Drainage: Green River; Reach: NE of Green River, Utah**
Damage Description: *Flood event within the Green River corridor – damaged river channel, diversion dam, pump station & road.*

Section 1D Site Evaluation

All answers in this Section must be YES in order to be eligible for EWP assistance.

Site Eligibility	**Yes**	**NO**	**Remarks**
Damage was a result of a natural disaster?*	**X**		*High flows directed at area above diversion cutbank and threaten diversion structure and headgate. River flooding eroded around pump station, road and threatened canal.*
Recovery measures would be for runoff retardation or soil erosion prevention?*	**X**		*Restoration of damaged diversion structure. Scour under structure due to extended high flows*
Threat to life and/or property?*	**X**		*Threat to diversion structure and the operation of 3 private canal systems and irrigation for ~4,000 acres*
Event caused a sudden impairment in the watershed?*	**X**		*Erosion of structure's foundation*
Imminent threat was created by this event?**	**X**		*Critical erosion undercutting structure – leading to potential failure with next large runoff event.*
For structural repairs, not repaired twice within ten years?**	**N/A**		*N/A*
Site Defensibility			
Economic, environmental, and social documentation adequate to warrant action? (Go to pages 3, 4, 5 and 6 ***)	**X**		*Protection of irrigation structures, road and private property.*
Proposed action technically viable? (Go to Page 9 ***)	**X**		*Protect against accelerated erosion, deposition. Proven/tested practices to be used. +Planting.*

Have all the appropriate steps been taken to ensure that all segments of the affected population have been informed of the EWP program and its possible effects? YES ___**X**__ NO _____ Advertised in local paper
Comments: *Information to Green River Conservation District and Emery Co. Commission = Sponsoring Organization.*

Section 1E Proposed Action

Describe the preferred alternative from Findings: Section 5 A:

1. *Restore Green River Diversion Dam and repair foundation damage*
2. *Re-construct embankment on the Hastings Ranch – East side of the River.*
3. *Stabilize River banks and stream channel at Green River Farms Pump Station and road damage area with a combination of rock rip rap with vegetation plantings (willow, etc…) for restoration of native habitat – 2 sites of protection work to be completed.*

Total installation cost identified in this DSR: Section 3: **$2,265,500**

Section 1F NRCS State Office Review and Approval

Reviewed By: _____ Date Reviewed: _____
State EWP Program Manager

Approved By: _____ Date Approved: _____
State Conservationist

PRIVACY ACT AND PUBLIC BURDEN STATEMENT

NOTE: The following statement is made in accordance with the Privacy Act of 1974, (5 U.S.C. 552a) and the Paperwork Reduction Act of 1995, as amended. The authority for requesting the following information is 7 CFR 624 (EWP) and Section 216 of the Flood Control Act of 1950, Public Law 81-516, 33 U.S.C. 701b-1; and Section 403 of the Agricultural Credit Act of 1978, Public Law 95-334, as amended by Section 382, of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104-127, 16 U.S.C. 2203. EWP, through local sponsors, provides emergency measures for runoff retardation and soil erosion control to areas where a sudden impairment of a watershed threatens life or property. The Secretary of Agriculture has delegated the administration of EWP to the Chief of NRCS on state, tribal and private lands.

Signing this form indicates the sponsor concurs and agrees to provide the cost-share to implement the EWP recovery measure(s) determined eligible by NRCS under the terms and conditions of the program authority. Failure to provide a signature will result in the applicant being unable to apply for or receive a grant the applicable program authorities. Once signed by the sponsor, this information may not be provided to other agencies. IRS, Department of Justice, or other State or Federal Law Enforcement agencies, and in response to a court or administrative tribunal.

The provisions of criminal and civil fraud statutes, including 18 U.S.C. 286, 287, 371, 641, 651, 1001; 15 U.S.C. 714m; and 31 U.S.C. 3729 may also be applicable to the information provided. According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0578-0030. The time required to complete this information collection is estimated to average 117/1.96 minutes/hours per response, including the time for reviewing instructions, searching existing data sources, field reviews, gathering, designing, and maintaining the data needed, and completing and reviewing the collection information.

USDA NONDISCRIMINATION STATEMENT

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.)

Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write USDA, Director of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-941 0 or call (800)795-3272 (voice) or (202)720-6382 (TDD). USDA is an equal opportunity provider and employer.

Civil Rights Statement of Assurance

The program or activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended; the Civil Rights Restoration Act of 1987 (Public Law 100-259); and other nondiscrimination statutes: namely, Section 504 or the Rehabilitation Act of 1973, Title IX of the Amendments of 1972, the Age Discrimination Act of 1975, and the Americans with Disabilities Act of 1990. They will also be in accordance with regulations of the Secretary of Agriculture (7 CFR 15, 15a, and 15b), which provide that no person in the United States shall on the grounds of race, color, national origin, gender, religion, age or disability, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

Section 2 Environmental Evaluation

2A Resource Concerns	2B Existing Condition	2C Alternatives and Effects		
		Proposed Action	**No Action**	**Alternative**
		1. *Restore Green River Diversion Dam and repair foundation damage; add new concrete apron; add fish screen and radial gate to the canal inlet;.* ***2.****Re-construct embankment on the Hastings Ranch – East side of the River.* ***3.*** *Stabilize River banks and stream channel at Green River Farms Pump Station and road damage area with a combination of rock rip rap with vegetation plantings (willow, etc…) for restoration of native habitat – 2 sites of protection work to be completed.*	***1-*** *Sponsors, other local representatives & property owners will complete whatever protection measures they can without federal assistance. As local funds become available.* ***2 -*** *Native vegetation will re-establish over time.*	*1. For streambank restoration areas: Planting to decrease erosion of river bank, pole planting, willows, j-hooks, rock barbs to help stabilize the banks.* *2. Diversion Dam: leave concrete apron as-is except for minor repairs where damaged; perform minimal repair with rock riprap in the foundation; install radial gate at canal inlet – with a proper fish screen for the T&E species in the River.*
		2D Effects of Alternatives		
Soil				
Soil Erosion (streambank/diversion foundation)	Bank/foundation erosion resulting from high runoff flows in the Green River.	Banks protected at key sites to protect infrastructure, diversion dam foundation restored – short/long-term (+)	Bank erosion will increase with time due to bare banks, vertical slopes; diversion may fail due to loss of foundation material	Bank work: Short term (-) erosion until veg established in the long term; Diversion: Short-term (-) during construction; Long-term (+)
Condition	NA	NA	NA	NA
Water				
Water quality – suspended sediments	Increased sediment due to bank erosion – affecting water quality of the river and increase to irrig. systems.	Long-term (+) water quality with protection of the banks – less bank erosion. Long-term channel dynamics with sections of armoring on the channel could affect natural geomorphic functions. Less erosion at diversion foundation	Short term WQ loading will be increased during high runoff events; Long-term slight increase until veg re-established	Long-term channel dynamics better with more vegetation planting at stream bank areas; Diversion short term (-) during construction ; long term (0)
Water Quantity	Threat to loss of irrigation water for 4,000 acres	Long-term (+) to irrigation systems, continued sustainability of farm operations.	Short/long term decrease to irrig. Systems.	Long-term (+) to irrigation systems, continued sustainability of farm operations.
Drinking water	NA	NA	NA	NA
Air				
Air quality – particulates	No effect	Short term (-) with construction at sites- dust; long-term(o)	No effect	Short term (-) with construction at sites- dust; long-term(o)

Plant				
Plant health and vigor	Minimal vegetation along stream corridor damaged and/or lost; threat to loss of irrigation water to 4,000 acres of cropland	Natural recruitment at worksites will diminish due to work; however plantings will replace lost natural recruitment. Irrigated acres protected.	Decrease in vigor with increased erosion at banks; irrigated acres still threatened for next storm event and potential failure of diversion.	Natural recruitment at worksites will diminish due to work; however plantings will replace lost natural recruitment. Irrigated acres protected.
Plants-invasives, noxious weeds	Erosion of bank areas has left bare areas open to invasive plant recruitment.	Short-term (-) during veg re-establishment period (2-5 yrs) after construction. Long-term invasive species control to maximize federal investment and maintain floodplain function. There will be competition from native species.	Damaged areas open to invasive recruitment, although, eventually, native vegetation will provide competition.	Short-term (-) during veg re-establishment period (2-5 yrs). Long-term invasive species control to maximize federal investment and maintain floodplain function. There will be competition from native species with the invasive species.
Animal				
T&E species	The presence of 4 endangered fish in the Green River will require an EA before any action. **Common Name** / **Scientific Name** Bonytail — Gila elegans Colorado Pikeminnow — Ptychocheilus lucius Humpback Chub — Gila cyphus Razorback Sucker — Xyrauchen texanus	Effects to be evaluated with EA.	Effects to be evaluated with EA.	Effects to be evaluated with EA.
Domestic animals	N/A	N/A	N/A	N/A
Wildlife habitat – food and cover	Vegetation along riparian corridor moderately damaged affecting overall food and cover availability.	Short-term (-) in the work area. Vegetation, once established, would be improved compared to the No Action alternative due to plantings.	Vegetation along riparian corridor moderately damaged. Veg should recover to produce healthy and diverse food & cover.	Short-term (-) in the work area. Vegetation, once established, would be improved compared to the No Action alternative due to plantings.
Sensitive Species	To be evaluated with EA documentation	To be evaluated with EA documentation	To be evaluated with EA documentation	To be evaluated with EA documentation
Other				

Human	Erosion of streambanks - creating threat to pump station, road, diversion structure and 3 canal operations for 4,000 acres.	Protection for streambanks , pump station, road, diversion structure and 3 canal systems benefitting 4,000 acres	Protection work would be done over time as City/County and private resources became available. No Federal assistance. Continued threat to infrastructure.	Protection for streambanks, pump station, road, diversion structure and 3 canal systems benefitting 4,000 acres,
Public Health & Safety	No effect	No effect	No effect	No effect

Completed By: **Wayne Urie** Date: 3/29/12

Section 2E Special Environmental Concerns

Resource Consideration	Existing Condition	Alternatives and Effects		
		Proposed Action	No Action	Alternative
Clean Water Act Waters of the U.S.	Consultation with Army Corp to occur as needed	Consultation will occur as per policy.	NA	Consultation will occur as per policy.
Coastal Zone Management Areas	N/A	N/A	N/A	N/A
Coral Reefs	N/A	N/A	N/A	N/A
Cultural Resources	Evaluation & consultation underway	SHPO clearance will be completed to address proposed action, which will mitigate any adverse effects.	N/A	SHPO clearance would be completed to address any alternative, which will mitigate potential adverse effects.
Endangered and Threatened Species	The presence of 4 endangered fish in the Green River will require an EA before any action. Common Name / Scientific Name Bonytail — Gila elegans Colorado Pikeminnow — Ptychocheilus lucius Humpback Chub — Gila cyphus Razorback Sucker — Xyrauchen texanus	Effects to be evaluated with EA.	Effects to be evaluated with EA.	Effects to be evaluated with EA.
Environmental Justice	No effect	No effect	No effect	No effect
Essential Fish Habitat	N/A	N/A	N/A	N/A
Fish and Wildlife Coordination	To be evaluated with EA documentation	To be evaluated with EA documentation	To be evaluated with EA documentation	To be evaluated with EA documentation
Floodplain Management	As per Exec Order 11988	Short-term (-) with construction in the floodplain; long-term (+) with veg & control	Risk of deposition on floodplains until veg re-established	Short-term (-) with construction in the floodplain; long-term (+) with veg & control
Invasive Species	Erosion of bank areas has left bare areas open to invasive plant recruitment.	Short-term (-) during veg re-establishment period (2-5 yrs) after construction. Long-term invasive species control to maximize federal investment and maintain floodplain function. There will be competition from native species.	Damaged areas open to invasive recruitment, although, eventually, native vegetation will provide competition.	Short-term (-) during veg re-establishment period (2-5 yrs). Long-term invasive species control to maximize federal investment and maintain floodplain function. There will be competition from native species with the invasive species.
Migratory Birds	Minor vegetation along riparian corridor damaged and/or lost. Returning birds will have very slightly less nesting habitat in the short-term.	No disturbance from construction activities since work will be outside nesting period. Natural recovery of vegetation will provide nesting	Returning birds will have slightly less nesting habitat in the short-term, however natural recovery of vegetation will provide nesting	No disturbance from construction activities since work will be outside nesting period. Natural recovery of vegetation will provide

		habitat in the long term	habitat in the long term. (0)	nesting habitat in the long term
Prime and Unique Farmlands	To be evaluated with EA documentation	To be evaluated with EA documentation	To be evaluated with EA documentation	To be evaluated with EA documentation
Riparian Areas	Minor vegetation along riparian corridor damaged and/or lost affecting minor overall food and cover availability.	Short-term (-) in the work area. Vegetation, once established, would be improved compared to the No Action alternative due to willow planting & improvement.	Vegetation along riparian corridor damaged and/or lost. Veg should recover to produce healthy and diverse food & cover.	Short-term (-) in the work area. Vegetation, once established, would be improved compared to the No Action alternative due to willow planting & improvement.
Scenic Beauty	Minor vegetation lost or damaged along riparian corridors.	Short-term (-) during construction; & until veg re-established; Veg plantings at the back toe of the proposed rock structure at the pump station will help restore the natural visual quality of the area. (+)	Area to recover naturally. Short term (-) and risk of invasive vegetation encroaching on damaged areas.	Short-term (-) during construction; & until veg re-established; Veg plantings at the back toe of the proposed rock structure at the pump station will help restore the natural visual quality of the area. (+)
Wetlands	No wetlands present	N/A	N/A	N/A
Wild and Scenic R.	N/A	N/A	N/A	N/A

Completed By: Wayne Urie Date: 3/29/12

Section 2F Economic

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Future Damages ($)	Damage Factor (%)	Near Term Damage Reduction
Properties Protected (Private)			
1) Green River Diversion Dam-740 feet long	2,000,000	20	400,000
2) 3 Canal Operations – serving ~4,900 acres of cropland: (Production value: 358 acres of melons valued @ $2430/ac = $869940.; 4542 acres of hay and corn cropland valued @ $804/ac = $3,651,768) from FSA crop report data and producer interviews	4,521,708	60	2,713,025
3) Irrigation Pump Station; 2-150 horsepower pumps (Value from irrigator's installation cost)	450,000	50	225,000
4) Historical Hastings Ranch (embankment repair)	8,000	50	4,000
5) Historical Water Wheel – E.Side of River	50,000	10	5,000
6) Power Generation Facility (Lee Thayn interview)	1,000,000	10	100,000
Properties Protected (Public)			
Hastings Road – adjacent to Pump Station	20,000	20	4,000
Business Losses			
Power Generation Capability (Lee Thayn annual income)	240,000	50	120,000
Other			
T & E Species *(difficult to put value for this damage survey)*			
		Estimated Cost = $2,265,500	
		Total Near Term Damage Reduction	3,346,025
		Net Benefit (Total Near Term Damage Reduction minus Cost from Section 3)	**1,080,525**

Completed By: Wayne Urie Date: 3/29/12

Section 2G Social Consideration

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Yes	No	Remarks
Has there been a loss of life as a result of the watershed impairment?		X	
Is there the potential for loss of life due to damages from the watershed impairment?		X	
Has access to a hospital or medical facility been impaired by watershed impairment?		X	
Has the community as a whole been adversely impacted by the watershed impairment (life and property ceases to operate in a normal capacity)	X		Diversion dam failure could impact operation for 3 canal systems affecting ~4,900 acres of cropland. Scour damage at the Green River Farms pump station could cause failure of the pumps with subsequent high runoff – loss of irrigation to 400 acres.
Is there a lack or has there been a reduction of public safety due to watershed impairment?	X		Access road damage could cause road to wash out with subsequent high runoff.

Completed By: Wayne Urie Date: 3/29/12

Section 2H Group Representation Information

This section is completed only for the preferred alternative selected.

Census tract(s): Emery County

Completed By: NRCS Date: **3/29/12**

Info Source: http://www.cubitplanning.com/city/13817-green-river-city-census-2010-population

Ethnic Population (2010)	
White	76.4%
Black	0.3%
American Indian	0.7%
Asian	0.5%
Pacific Islander	0%
Hispanic/All Races	21.4%

2000 Census Data

Geographic area	Population	Housing units	Area in square miles			Density per square mile of land area	
			Total area	Water Area	Land Area	Population	Housing units
Green River City, Emery County	973	376	12.6	0.1	12.5	77.8	30.0

Source: http://en.wikipedia.org/wiki/Green_River,_Utah

Section 2I. Required consultation or coordination between the lead agency and/or the RFO and another governmental unit including tribes:

Easements, permissions, or permits:

Access easement – Land Rights easement for Sponsor to do work
404 Stream Alteration Permit – ACOE/Div of Water Rights (Sponsor to procure)
Individual Private Property owners (Sponsor will procure)
SHPO Consultation – Andrew Williamson, Archaeologist, NRCS – Review Sponsors findings, forward to SHPO

Mitigation Description:

To be evaluated with proposed EA for the proposed action.

Agencies, persons, and references consulted, or to be consulted:

- *USFWS*
- *Utility Companies: Gas, Electric – for all construction work proposed*
- *Wildlife Habitat agencies (T&E, Sensitive Species list, Nesting periods,etc….)*
- *Stream Alterations Permit Process /ACOE Coordination*
- *State Historic Preservation Officer (SHPO) Coordination: Andrew Williamson (NRCS Archaeologist)*
- *Green River Conservation District: Chair = Chris Dunham*
- *1) Thayn Canal; 2) Green River Canal Co. 3)East Side Canal*
- *Green River City*
- *Emery County Commission and Grand County Council Coordination*

Section 3 Engineering Cost Estimate

Completed By: _____B.Smart_____ Date: 12/03/2011

This section must be completed by each alternative considered (attach additional sheets as necessary).

Item	Description	Quantity	Unit	Unit Price	Amount
1	Repair Diversion Dam	1	EA		1,300,000
	Fish Screen	1	EA		300,000
	Radial Gate Operation	1	EA		300,000
2	Rock Riprap (Div Dam Foundation)	740	LF	400	296,000
3	Pump Station Protection	150	LF	400	60,000
	Plantings – toe, mid, top	150	EA	10	1,500
	~50 plnts/row = 150 plants				
4	Embankment repair-Hastings Ranch – E.side	100	LF	80	8,000
	TOTAL				**$2,265,500**

AC	Acre	LF	Linear Feet	TN	Ton
CY	Cubic Yard	LS	Lump Sum	Other (Specify)	
EA	Each	SF	Square Feet		
HR	Hour	SY	Square Yard		

Section 4 NRCS EWP Funding Priority

Complete the following section to compute the funding priority for the recovery measures in this application (see instructions on page 14).

Priority Ranking Criteria	Yes	No		Ranking Number Plus Modifier
1. Is this an exigency situation?		X		
2. Is this a site where there is serious, but not immediate threat to human life?		X		
3. Is this a site where buildings, utilities, or other important infrastructure components are threatened?	X			3
4. Is this site a funding priority established by the NRCS Chief?	X			
The following are modifiers for the above criteria			**Modifier**	
a. Will the proposed action or alternatives protect or conserve federally-listed threatened and endangered species or critical habitat?			a	
b. Will the proposed action or alternatives protect or conserve cultural sites listed on the National Register of Historic Places?			b	
c. Will the proposed action or alternatives protect or conserve prime or important farmland?			-	
d. Will the proposed action or alternatives protect or conserve existing wetlands?			-	
e. Will the proposed action or alternatives maintain or improve current water quality conditions?			e	
f. Will the proposed action or alternatives protect or conserve unique habitat, including but not limited to, areas inhabited by State-listed species, fish and wildlife management area, or State identified sensitive habitats?			f	

Enter priority computation in Section 1A, NRCS Entry, Funding priority number.

3-abef

Remarks:

Consultation with habitat managers will be carried out to consider any potential effects on species within the proposed work areas. SHPO consultation will be carried out to ensure consideration of any potential historical resources within the proposed work areas – with consideration to ingress and egress areas.

An EA is proposed for the proposed EWP work since it is deemed outside of the EWP Programmatic EIS analysis. There are T& E fish species present in the Green River that will need to be considered in the alternative analysis.

A Statement of Work for the EA will be based on the Preliminary Design Report for the Green River Diversion Dam where some initial alternatives for the repair of the structure were evaluated for engineering/technical feasibility and costs. Other work identified by the sponsors which is eligible for EWP assistance will be considered in the EA.

Section 5A Findings

Finding: Indicate the preferred alternative from Section 2 (Enter to Section 1E): Proposed Action

1. *Restore Green River Diversion Dam and repair foundation damage*
2. *Re-construct embankment on the Hastings Ranch – East side of the River.*
3. *Stabilize River banks and stream channel at Green River Farms Pump Station and road damage area with a combination of rock rip rap with vegetation plantings (willow, etc…) for restoration of native habitat – 2 sites of protection work to be completed.*

I have considered the effects of the action and the alternatives on the Environmental Economic, Social; the Special Environmental Concerns; and the extraordinary circumstances (40 CFR 1508.27). I find for the reasons stated below, that the preferred alternative:

http://www.nrcs.usda.gov/programs/Env_Assess/EWP_FINALPEIS/EWP.html

X Has been sufficiently analyzed in the EWP PEIS (reference all that apply)
- Chapter 2 Program Objectives & Constraints, Restoration Practices (Streambank, Debris, Levee/Dam)
- Chapter 3 Program Alts-Impacts on Watershed Ecosystems, Human Communities, Mitigation requirements
- Chapter 4 Affected Environment
- Chapter 5 Environmental Consequences
- Chapter

_X__ May require the preparation of an environmental assessment or environmental impact statement.
The action will be referred to the NRCS State Office on this date: 3/29/12

NRCS representative of the DSR team: Wayne Urie, N.Evenstad, J.Roper.

Title: DSR Team Date: 3/29/12

Section 5B Comments :

The estimated cost and final design for the proposed measures are subject to change pending consultation with stakeholders, habitat managers, land managers and regulatory authorities. Final design considerations will evaluate the realiability and technical adequacy to provide the needed protection. Ingress and egress will be considered. Further analysis will be carried out in the EA process, including a public meeting and any of the required NEPA documentation.

Section 5C

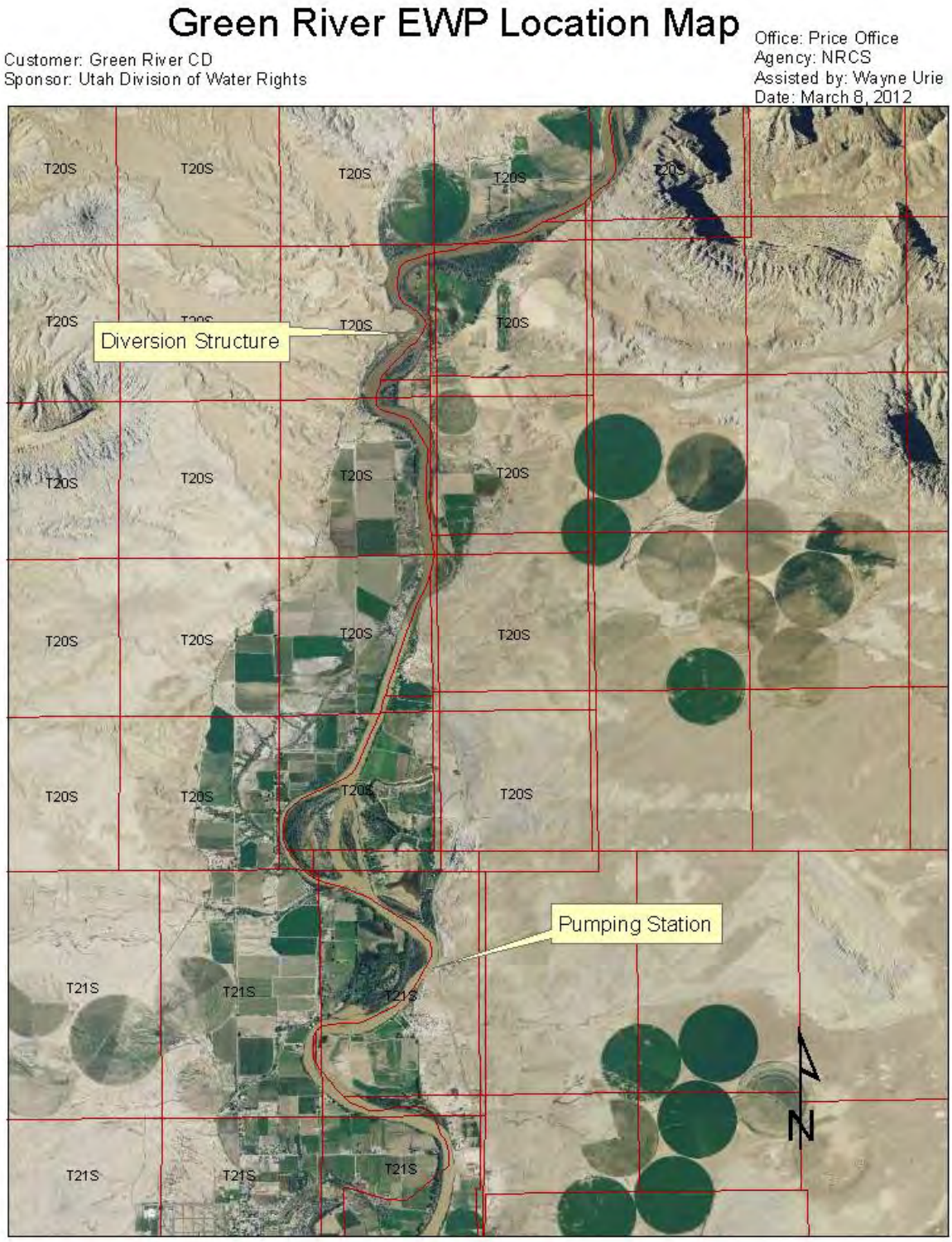
Sponsor Concurrence : _____ _____

Sponsor Representative

Title: _____ Date: _____

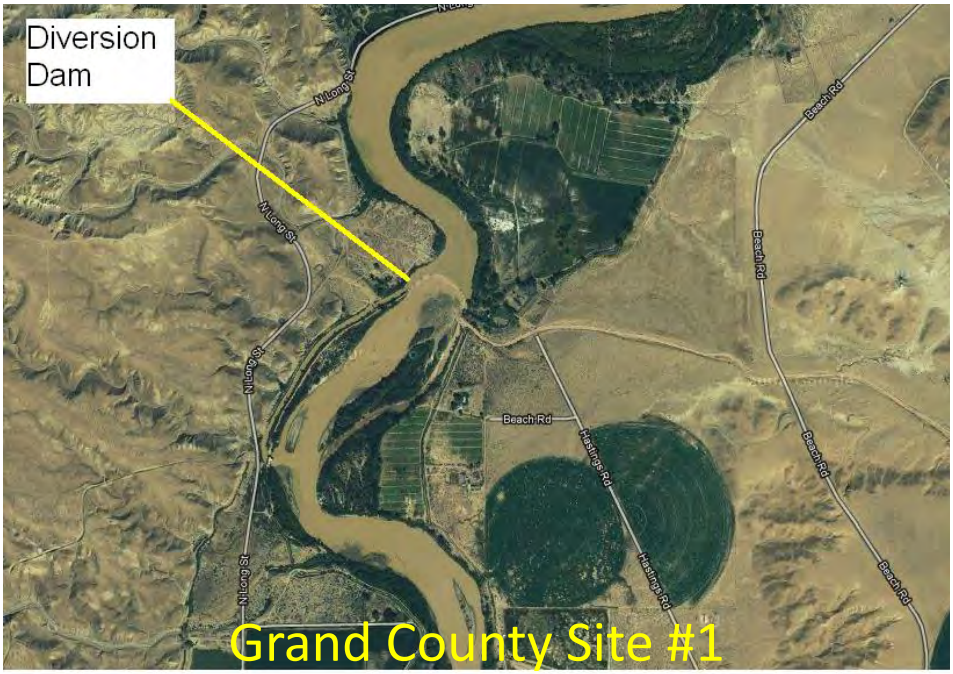
Section 6 Attachments:
A. Location Map
B. Site Plan or Sketches
C. Other (explain): Photos & Endangered Species List

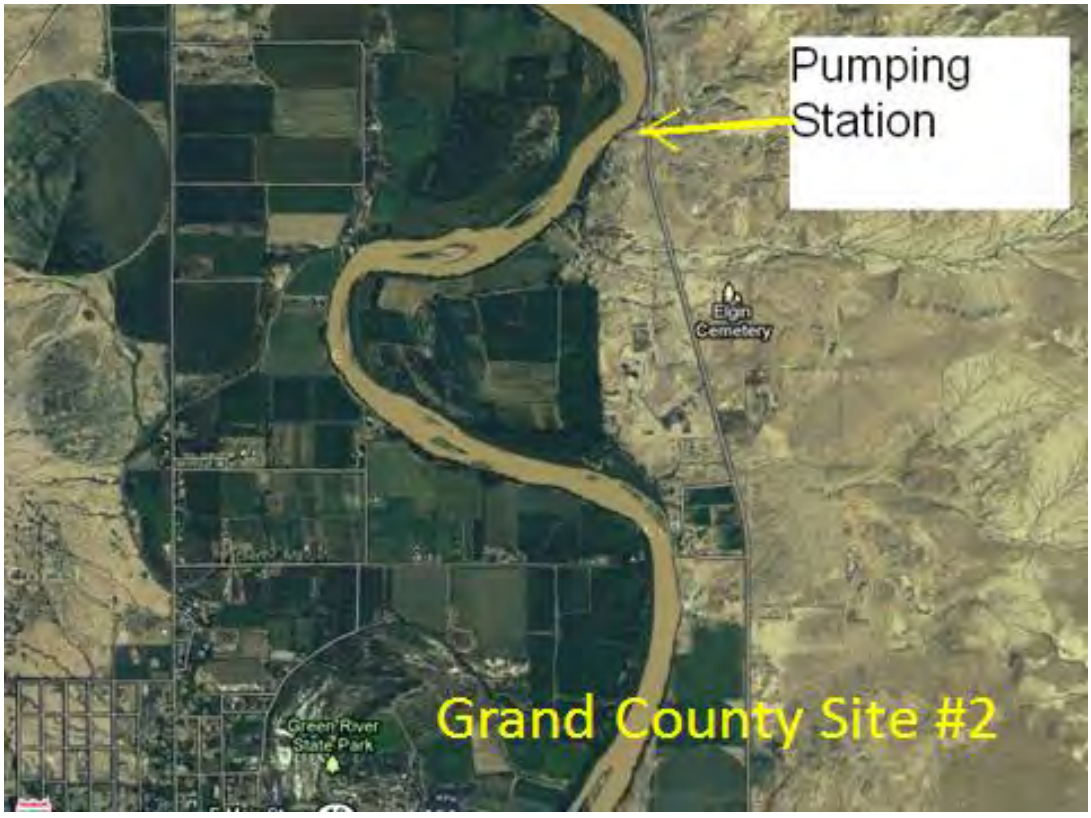
Attachment A: Location Map



Attachment B:

Site Plan or Sketches






Grand County Site #3
N Long St
N Long St
Hastings Rd
Hastings Rd
Hastings Rd
Hastings Rd
General location of canal threatened by high flows

Attachment C:
Photos

Figure 1: Diversion Dam

Attachment D:
Threatened & Endangered Species

Emery County

Common Name	Scientific Name	Status
Jones Cycladenia	*Cycladenia humilis var jonesii*	T
Last Chance Townsendia	*Townsendia aprica*	T
Barneby Reed-mustard	*Schoenocrambe barnebyi*	E
San Rafael Cactus	*Pediocactus despainii*	E
Winkler Pincushion Cactus	*Pediocactus winkleri*	T
Wright Fishhook Cactus	*Sclerocactus wrightiae*	E
Humpback Chub	*Gila cypha*	E
Bonytail	*Gila elegans*	E
Colorado Pikeminnow	*Ptychocheilus lucius*	E
Razorback Sucker	*Xyrauchen texanus*	E
Greater Sage-grouse	*Centrocercus urophasianus*	C
Yellow-billed Cuckoo	*Coccyzus americanus*	C
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Black-footed Ferret	*Mustela nigripes*	E Extirpated
Canada Lynx	*Lynx canadensis*	T
Gray Wolf	*Canis lupus*	E

Grand County

Common Name	Scientific Name	Status
Jones Cycladenia	*Cycladenia humilis var jonesii*	T
Humpback Chub	*Gila cypha*	E
Bonytail	*Gila elegans*	E
Colorado Pikeminnow	*Ptychocheilus lucius*	E
Razorback Sucker	*Xyrauchen texanus*	E
Greater Sage-grouse	*Centrocercus urophasianus*	C
Gunnison Sage-grouse	*Centrocercus minimus*	C
Mexican Spotted Owl	*Strix occidentalis lucida*	T
Yellow-billed Cuckoo	*Coccyzus americanus*	C
Black-footed Ferret	*Mustela nigripes*	E Extirpated

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-5059** APPLICATION/CLAIM NO.: **D46** CERT. NO.:
CHANGES: a26540 (Filed: 04/15/2002) Approved

OWNERSHIP

NAME: Dorothy A. Carter
ADDR: 743 North 800 East
Price UT 84501

NAME: Green River Canal Company
ADDR: P.O. Box 84
Green River UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 06/18/1952|PRIORITY: / /1880|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [ ]|ActionDate: |PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: 11/06/1969|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [91-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Diligence Claim Source of Info: Ownership Segregation **Status: Water User's Claim**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 16.0 acre-feet
SOURCE: Green River (Gravity Canal)
COUNTY: Emery COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1950 ft W 800 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 615941.

IRRIGATION: 4.0 acres PERIOD OF USE: 04/01 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER NW	NW NE	NW SW	NW SE	NORTH EAST QUARTER NW	NE NE	NE SW	NE SE	SOUTH WEST QUARTER NW	SW NE	SW SW	SW SE	SOUTH EAS NW	SE NE
Sec 20 T 20S R 16E SLBM								X						X
Sec 29 T 20S R 16E SLBM						X		X		X		X	X	X
Sec 31 T 20S R 16E SLBM								X		X				X
Sec 32 T 20S R 16E SLBM	X	X	X	X				X						
Sec 03 T 21S R 16E SLBM *LOT 1														
Sec 03 T 21S R 16E SLBM *LOT 2														
Sec 03 T 21S R 16E SLBM *LOT 3														
Sec 03 T 21S R 16E SLBM *LOT 4														
Sec 03 T 21S R 16E SLBM *LOT 9														
Sec 03 T 21S R 16E SLBM *LOT 10														
Sec 03 T 21S R 16E SLBM *LOT 11														
Sec 04 T 21S R 16E SLBM												X	X	
Sec 04 T 21S R 16E SLBM *LOT 1														
Sec 04 T 21S R 16E SLBM *LOT 16														
Sec 04 T 21S R 16E SLBM *LOT 20														
Sec 09 T 21S R 16E SLBM	X		X	X	X	X	X		X		X	X		
Sec 10 T 21S R 16E SLBM	X	X	X	X		X		X	X	X	X	X		
Sec 15 T 21S R 16E SLBM	X	X	X					X	X		X			
Sec 16 T 21S R 16E SLBM		X		X	X	X	X		X		X	X	X	
Sec 21 T 21S R 16E SLBM					X									
Sec 22 T 21S R 16E SLBM	X		X											

GROU

SEGREGATION HISTORY

This Right was Segregated from 91-294, with Appl#: D46, Approval Date: / / under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	16.0	4.0000						

Stock Cert. #143.

**********E N D O F D A T A**********

THIS RIGHT IS BEING PROTESTED IN A PROPOSED DETERMINATION BOOK!!!

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-294** APPLICATION/CLAIM NO.: **D46** CERT. NO.:

OWNERSHIP

NAME: Green River Canal Company
ADDR: Green River UT 84525
INTEREST: 100%

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 06/18/1952|PRIORITY: / /1880|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [ ]|ActionDate: |PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: 11/06/1969|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [91-5]|MAP: [144d]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Diligence Claim Source of Info: Proposed Determination **Status: Water User's Claim**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 59.8374 cfs OR 5888.2 acre-feet
SOURCE: Green River (Gravity Canal)
COUNTY: Emery COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1950 ft W 800 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT******** ***ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 614585.
91-294(WUC)

IRRIGATION: Sole Supply: 1439.5 acres of the Group Total of 1443.5 PERIOD OF USE: 04/01 TO 10/31

STOCKWATER: Sole Supply: 2700.0000 ELUs of the Group Total of 2700.0000 PERIOD OF USE: 11/01 TO 03/31

DOMESTIC: Sole Supply: 75.0000 EDUs of the Group Total of 75.0000 PERIOD OF USE: 11/01 TO 03/31

###PLACE OF USE:	NORTH WEST QUARTER NW	NW NE	NW SW	NW SE	NE NW	NE NE	NE SW	NE SE	SW NW	SW NE	SW SW	SW SE	SE NW	SE NE
Sec 20 T 20S R 16E SLBM								9.2000						1.7000
Sec 29 T 20S R 16E SLBM					7.7000			9.0000		0.7000		23.3000	24.3000	0.2000
Sec 31 T 20S R 16E SLBM								23.0000						28.4000
Sec 32 T 20S R 16E SLBM	9.3000	36.0000	35.7000	17.7000	4.7000				7.2000					
Sec 03 T 21S R 16E SLBM	LOT 1													
Sec 03 T 21S R 16E SLBM	LOT 10													
Sec 03 T 21S R 16E SLBM	LOT 11													
Sec 03 T 21S R 16E SLBM	LOT 2													
Sec 03 T 21S R 16E SLBM	LOT 3													
Sec 03 T 21S R 16E SLBM	LOT 4													
Sec 03 T 21S R 16E SLBM	LOT 9													
Sec 04 T 21S R 16E SLBM												4.1000	0.7000	20.0000
Sec 04 T 21S R 16E SLBM	LOT 1													
Sec 04 T 21S R 16E SLBM	LOT 16													
Sec 09 T 21S R 16E SLBM		16.0000		1.1000	33.8000	36.0000	37.5000	37.7000		1.7000		9.2000	43.2000	
Sec 10 T 21S R 16E SLBM	39.0000	31.6000	36.2000	38.6000	20.0000		33.2000		38.7000	40.0000	25.7000	34.3000	22.7000	
Sec 15 T 21S R 16E SLBM	37.6000	20.7000	5.7000	0.4000					8.5000		5.2000			
Sec 16 T 21S R 16E SLBM		4.4000			29.5000	13.9000	16.2000	29.4000		2.0000		0.2000	28.5000	22.5000
Sec 21 T 21S R 16E SLBM						23.0000								
Sec 22 T 21S R 16E SLBM	3.5000		1.4000											

GROU

SUPPLEMENTAL GROUP NO.: 614885. Water Rights Appurtenant to the following use(s):
91-294(WUC),3711(WUC)

IRRIGATION: Sole Supply: UNEVALUATED acres Group Total: 2.0 PERIOD OF USE: 03/01 TO 11/15

###PLACE OF USE: *-------NORTH WEST QUARTER------*-------NORTH EAST QUARTER------*-------SOUTH WEST QUARTER------*-------SOUTH EAS

	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE
Sec 09 T 21S R 16E SLBM	*				*		2.0000		*				*	

GROU

This Right (91-294) has an evaluated sole-supply total for irrigation of 1439.5000 acres.

This Right (91-294) is a member of 2 supplemental water right groups with irrigated acreage totaling 1445.5000 acres.

PLACE OF USE for STOCKWATERING

	NORTH-WEST¼ NW NE SW SE	NORTH-EAST¼ NW NE SW SE	SOUTH-WEST¼ NW NE SW SE	SOUTH-EAST¼ NW NE SW SE
Sec 20 T 20S R 16E SLBM	* : : : *	* : : : X*	* : : : *	* : X: : *
Sec 29 T 20S R 16E SLBM	* : : : *	* : X: : X*	* : X: : X*	* X: X: X: *
Sec 31 T 20S R 16E SLBM	* : : : *	* : : : X*	* : : : *	* : X: : X*
Sec 32 T 20S R 16E SLBM	* X: X: X: X*	* X: : : *	* X: : : *	* : : : *
Sec 03 T 21S R 16E SLBM	*LOT 1			
Sec 03 T 21S R 16E SLBM	*LOT 2			
Sec 03 T 21S R 16E SLBM	*LOT 3			
Sec 03 T 21S R 16E SLBM	*LOT 4			
Sec 03 T 21S R 16E SLBM	*LOT 9			
Sec 03 T 21S R 16E SLBM	*LOT 10			
Sec 03 T 21S R 16E SLBM	*LOT 11			
Sec 04 T 21S R 16E SLBM	* : : : *	* : : : *	* : : : *	* X: : : *
Sec 04 T 21S R 16E SLBM	* : : : *	* : : : *	* : : : *	* : : : X*
Sec 04 T 21S R 16E SLBM	* : : : *	* : : : *	* : : : *	* : : X: *
Sec 04 T 21S R 16E SLBM	* : : : *	* : : : *	* : : : X*	* : : : *
Sec 04 T 21S R 16E SLBM	*LOT 1			
Sec 04 T 21S R 16E SLBM	*LOT 16			
Sec 04 T 21S R 16E SLBM	*LOT 20			
Sec 09 T 21S R 16E SLBM	* : X: : X*	* X: X: X: X*	* : X: : X*	* X: : X: X*
Sec 10 T 21S R 16E SLBM	* X: X: X: X*	* X: : X: *	* X: X: X: X*	* X: : X: *
Sec 15 T 21S R 16E SLBM	* X: X: X: X*	* : : : *	* X: : X: *	* : : : *
Sec 16 T 21S R 16E SLBM	* : X: : *	* X: X: X: X*	* : X: : *	* X: X: : *
Sec 16 T 21S R 16E SLBM	* : : : *	* : : : *	* : : : X*	* : : X: X*
Sec 21 T 21S R 16E SLBM	* : : : *	* : X: : *	* : : : *	* : : : *
Sec 22 T 21S R 16E SLBM	* X: : X: *	* : : : *	* : : : *	* : : : *

SEGREGATION HISTORY

This Right was Segregated from , with Appl#: , Approval Date: / / under which Proof is to be submitted.

This Right as originally filed:

FLOW IN CFS	QUANTITY IN *-W A T E R U S E S-* ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					-ACRE-FEET-			
60.0 OR	5904.2	1443.5000	2700.0000	75.0000				

The following Water Rights have been Segregated from 91-294:

(1) WRNUM: 91-5059 0.1626 OR 16.0 4.0000
APPL#: D46
NAME: Green River Canal Company
FILED: 04/15/2002 STATUS:
APPR:
Stock Cert. #143. Change Appl. a26540. Dorothy A. Carter

CFS	ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					-ACRE-FEET-			
91-294 currently has: - 59.8374 OR	5888.2	1439.5000	2700.0000	75.0000				

E N D O F D A T A

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-5043** APPLICATION/CLAIM NO.: **A73213** CERT. NO.:

OWNERSHIP

NAME: Green River Canal Company
ADDR: P.O. Box 84
Green River UT 84525

DATES, ETC.

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LAND OWNED BY APPLICANT? Yes                COUNTY TAX ID#:
FILED:     11/03/2000|PRIORITY:  11/03/2000|PUB BEGAN: 11/28/2000|PUB ENDED: 12/05/2000|NEWSPAPER:  Emery County Progress
ProtestEnd:12/25/2000|PROTESTED: [HearHeld]|HEARNG HLD:           |SE ACTION: [Approved]|ActionDate:06/24/2009|PROOF DUE:  06/30/2014
EXTENSION:           |ELEC/PROOF:[        ]|ELEC/PROOF:           |CERT/WUC:            |LAP, ETC:             |LAPS LETTER:
RUSH LETTR:          |RENOVATE:            |RECON REQ:            |TYPE: [              ]|50YR DATE: 06/24/2059
PD BOOK: [  91-     ]|MAP:  [             ]|PUB DATE:
```

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Application to Appropriate **Status: Approved**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 20.0 cfs
SOURCE: Green River (tributary to Colorado River)
COUNTY: Emery COMMON DESCRIPTION: Tusher Wash dam

POINT OF DIVERSION -- SURFACE:
(1) N 1950 ft W 800 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source: Green River (tributary to Colorado River)

Stream Alt Required?: No

USES OF WATER RIGHT******** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ************ *EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 615925.

OTHER: Non-consumptive use to sluice the raceway and canal system. PERIOD OF USE: 01/01 TO 12/31
Acre Feet Contributed by this Right for this Use: 36198.99902

OTHER COMMENTS

This water will not be used on any acreage but will be non-conmusptively used in the raceway and canal system from the Tusher Wash Dam down to the terminus of the canal system where the water flows back into the Green River. The water sought under this application is needed to flush out the heavy silt build up in the Applicant's raceway and canal system caused by the extremely high silt loading of the Green River and the long, flat terrain over which the canal system traverses. The canal system must operate at capacity in order to function properly. This application aguments the sluice water contained in Water Right No. 91-294 (Dil. Claim 46), but the Applicant reserves all of its rights under said Diligence Claim, including the claimed diversion right to a total of 80 cfs during the irrigation season. The water will be returned at numerous sluice gates along the canal system.

PROTESTANTS

NAME: Lee Thayn
ADDR: P.O. Box 447
Green River UT 84525

NAME:
ADDR:

E N D O F D A T A

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-39** APPLICATION/CLAIM NO.: **A6074** CERT. NO.: 1299

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OWNERSHIP

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NAME: Green River City
ADDR: Green River UT 84525
INTEREST: 100%

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DATES, ETC.

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LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 02/22/1915|PRIORITY: 09/12/1921|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:09/09/1915|PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: 12/08/1969|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [91-5]|MAP: [144d]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Certificate**

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LOCATION OF WATER RIGHT***(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER*****GOOGLE VIEW***

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FLOW: 220.0 cfs
SOURCE: Green River
COUNTY: Emery COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1950 ft W 800 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

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USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

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SUPPLEMENTAL GROUP NO.: 614975.

POWER: Green River City Hydro-Electric Power Plant, rated at KW. PERIOD OF USE: 01/01 TO 12/31
CFS Contributed by this Right for this Use: 159275.5957

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**********E N D O F D A T A**********

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(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-5075** APPLICATION/CLAIM NO.: **A30414dw1** CERT. NO.:
CHANGES: a27714 (Filed: 04/03/2003) Approved

OWNERSHIP

NAME: Gunnison Butte Mutual Irrigation Company
ADDR: P.O. Box 447
Green River UT 84525

NAME: State of Utah Board of Water Resources
ADDR: P.O. Box 146201
Salt Lake City UT 84114-6201

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 04/01/2003|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:10/06/1959|PROOF DUE: 10/31/2020
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]|50YR DATE: 10/06/2009
PD BOOK: [91-]|MAP: [ ]|PUB DATE:
*TYPE -- DOCUMENT -- STATUS

Type of Right: Application to Appropriate Source of Info: Application to Segregate **Status: Approved**

LOCATION OF WATER RIGHT***(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW*

FLOW: 2879.7792 acre-feet
SOURCE: Green River
COUNTY: Emery COMMON DESCRIPTION: 5.5 miles North of Green River

POINTS OF DIVERSION -- SURFACE:
(1) S 569 ft W 911 ft from E4 cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Tusher Diversion Dam Source: Green River
(2) N 1244 ft W 579 ft from E4 cor, Sec 20, T 20S, R 16E, SLBM
Diverting Works: Wilson Pump Source: Green River

Stream Alt Required?: No

USES OF WATER RIGHT******** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 616607.

IRRIGATION: Sole Supply: 576.417 acres of the Group Total of 6206.25 PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 20 T 20S R 16E SLBM		X						X						
Sec 20 T 20S R 16E SLBM *LOT 1														
Sec 29 T 20S R 16E SLBM							X							
Sec 29 T 20S R 16E SLBM *LOT 2														
Sec 30 T 20S R 16E SLBM								X					X	
Sec 31 T 20S R 16E SLBM												X		
Sec 04 T 21S R 16E SLBM								X	X	X	X			
Sec 04 T 21S R 16E SLBM *LOT 10														
Sec 04 T 21S R 16E SLBM *LOT 11														
Sec 04 T 21S R 16E SLBM *LOT 12														
Sec 04 T 21S R 16E SLBM *LOT 13														
Sec 04 T 21S R 16E SLBM *LOT 6														
Sec 04 T 21S R 16E SLBM *LOT 7														
Sec 04 T 21S R 16E SLBM *LOT 9														
Sec 05 T 21S R 16E SLBM								X	X	X	X		X	
Sec 05 T 21S R 16E SLBM *LOT 13														
Sec 05 T 21S R 16E SLBM *LOT 15														
Sec 05 T 21S R 16E SLBM *LOT 17														
Sec 05 T 21S R 16E SLBM *LOT 18														
Sec 05 T 21S R 16E SLBM *LOT 19														
Sec 05 T 21S R 16E SLBM *LOT 20														
Sec 05 T 21S R 16E SLBM *LOT 7														
Sec 05 T 21S R 16E SLBM *LOT 9														
Sec 08 T 21S R 16E SLBM							X						X	

GROU

OTHER COMMENTS

GENERAL:
The water under this application was originally allocated to the Flaming Gorge Project. It was not developed and was eventually assigned to the Board of Water Resources. The applicant, by Contract and Assignment, received the

right to divert 24825 acre-feet of water to irrigate 6206.25 acres. It was originally thought that a portion of this water would be used supplementally with existing rights, however now that the project is being refined, all of the water will be used on new land.
Using the depletion limit of 15143 acre-feet, and 3.0475 acre-feet depletion/acre of land, it was determined that 4969 acres of land could be irrigated under the contract. The annual diversion duty is 4.996 acre-feet/acre. Therefore, the hereafter portion of the change application is based on the above acreage, the depletion/acre and the diversion/acre. The depletion figures were taken from Research Report #145, Consumptive Use of Irrigated Crops in Utah, using the Green River date on page 212.
The annual depletion under this application is limited to 3531.14 acre-feet of water.
The water rights associated with the contract and original assignment and segregation under 41-3531 (A30414dw) have now been further segregated and changed to 92-638 (A30414dw) a27713; 91-5075 (A30414dw1) a27714; 93-3750 (A30414dw2) a27715.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: 30414dw1, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					ACRE-FEET			
	5788.9	1158.2070						

A segregated portion of 92-638. Flaming Gorge project water

The following Water Rights have been Segregated from 91-5075:

(1) WRNUM: 91-5161 2625.398 525.5000
APPL#: A30414dw1a
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:

(2) WRNUM: 91-5162 281.22484 56.2900
APPL#: A30414dw1b
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/29/2008 STATUS: UNAP
APPR:

Was segregated for 56.79 acres but 0.5 acre was returned to parent

	CFS	ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
						ACRE-FEET			
91-5075 currently has:		2882.27716	576.4170						

PROTESTANTS

NAME: United States Bureau of Reclamation
ADDR: c/o Curtis A. Pledger
302 East 1860 South
Provo, UT 84606-7317

NAME:
ADDR:

APPLICATIONS FOR EXTENSIONS OF TIME WITHIN WHICH TO SUBMIT PROOF

FILED: 10/29/2009|PUB BEGAN: 06/22/2010|PUB ENDED: 06/29/2010|NEWSPAPER: Emery County Progress
ProtestEnd:07/19/2010|PROTESTED: [No Hear]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:10/27/2011|PROOF DUE: 10/31/2020

END OF DATA

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-113** APPLICATION/CLAIM NO.: **A11479** CERT. NO.: 4617

OWNERSHIP

NAME: Lee R. Thayn
ADDR: Box 447
Green River UT 84525
INTEREST: 100%

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 11/17/1933|PRIORITY: 11/17/1933|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:03/21/1934|PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: 10/23/1969|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [91-5]|MAP: [144d]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 35.0 cfs
SOURCE: Green River
COUNTY: Emery COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 800 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 613973.

IRRIGATION: Sole Supply: 1362.71 acres of the Group Total of 1543.24 PERIOD OF USE: 04/01 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 20 T 20S R 16E SLBM				21.0000			38.0000	8.6000		29.1000		23.4000	38.0000	
Sec 29 T 20S R 16E SLBM	1.3000	24.1000	35.6000	39.2000	38.0000	15.3000	17.9000		39.5000	38.0000	40.0000	13.7000	6.1000	
Sec 30 T 20S R 16E SLBM								13.0000					8.1000	38.0000
Sec 31 T 20S R 16E SLBM					30.0000	32.7000	35.5000	0.7000					26.0000	
Sec 32 T 20S R 16E SLBM	24.1000										2.6000			
Sec 03 T 21S R 16E SLBM	LOT 1													
Sec 04 T 21S R 16E SLBM	LOT 1													
Sec 09 T 21S R 16E SLBM	40.0000	21.8000	40.0000	35.5000			6.5000		40.0000	30.6000	23.5200	16.6200	3.4000	

GROU

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**********E N D O F D A T A**********
****

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-4130** APPLICATION/CLAIM NO.: **A44455** CERT. NO.: CERTIFICAT
CHANGES: a12054 (Filed: 05/11/1981) Certificate (Issued: 02/20/1998)

OWNERSHIP

NAME: Lee R. Thayn
ADDR: P.O. Box 447
Green River UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? Yes COUNTY TAX ID#:
FILED: 11/25/1974|PRIORITY: 11/25/1974|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/01/1975|PROOF DUE:
EXTENSION: |ELEC/PROOF:[Election]|ELEC/PROOF:06/03/1975|CERT/WUC: 02/20/1998|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [91-]|MAP: [144d]|PUB DATE:
***TYPE -- DOCUMENT -- STATUS**
Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 600.0 cfs
SOURCE: Green River
COUNTY: Emery COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 800 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Open Canal (Race Way) Source:

Stream Alt Required?: No

POINT OF RETURN:
(1) N 410 ft E 300 ft from S4 cor, Sec 17, T 20S, R 16E, SLBM
Comment: Returned Water: 600.0 cfs

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 615048.
91-4130(CERT)

POWER: Thayn Hydro Hydro-Electric Power Plant, rated at 450 KW. PERIOD OF USE: 01/01 TO 12/31
CFS Contributed by this Right for this Use: Unevaluated

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS			
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE		
Sec 17 T 20S R 16E SLBM																

GROU

SUPPLEMENTAL GROUP NO.: 615169. Water Rights Appurtenant to the following use(s):
91-4130(CERT),4273(LAP)

POWER: Unnamed Hydro-Electric Power Plant, rated at 2000 KW. PERIOD OF USE: 01/01 TO 12/31
CFS Contributed by this Right for this Use: Unevaluated

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS			
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE		
Sec 17 T 20S R 16E SLBM																

GROU

**********E N D O F D A T A**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **91-5161** APPLICATION/CLAIM NO.: **A30414dw1a** CERT. NO.: CERTIFICAT
CHANGES: a27714a (Filed: 04/03/2003) Amended by Subsequent Change
a35184 (Filed: 12/24/2008) Certificate (Issued: 04/14/2010)

OWNERSHIP

NAME: Lee Thayn
ADDR: P.O. Box 447
Green River, UT 84525
INTEREST: 100%

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 04/14/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [91-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 3153.0 acre-feet
SOURCE: Green River
COUNTY: Emery COMMON DESCRIPTION: 2 miles N of Green River City

POINT OF DIVERSION -- SURFACE:
(1) S 500 ft E 4330 ft from W4 cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Tusher Diversion Dam Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 629865.

IRRIGATION: 525.5 acres PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER NW	NORTH WEST QUARTER NE	NORTH WEST QUARTER SW	NORTH WEST QUARTER SE	NORTH EAST QUARTER NW	NORTH EAST QUARTER NE	NORTH EAST QUARTER SW	NORTH EAST QUARTER SE	SOUTH WEST QUARTER NW	SOUTH WEST QUARTER NE	SOUTH WEST QUARTER SW	SOUTH WEST QUARTER SE	SOUTH EAS NW	SOUTH EAS NE
Sec 04 T 21N R 16E SLBM									X	X	X	X		
Sec 04 T 21N R 16E SLBM *LOT 10														
Sec 04 T 21N R 16E SLBM *LOT 11														
Sec 04 T 21N R 16E SLBM *LOT 12														
Sec 04 T 21N R 16E SLBM *LOT 13														
Sec 04 T 21N R 16E SLBM *LOT 19														
Sec 04 T 21N R 16E SLBM *LOT 7														
Sec 04 T 21N R 16E SLBM *LOT 9														
Sec 05 T 21N R 16E SLBM									X	X	X	X	X	
Sec 05 T 21N R 16E SLBM *LOT 13														
Sec 05 T 21N R 16E SLBM *LOT 14														
Sec 05 T 21N R 16E SLBM *LOT 15														
Sec 05 T 21N R 16E SLBM *LOT 16														
Sec 05 T 21N R 16E SLBM *LOT 17														
Sec 05 T 21N R 16E SLBM *LOT 18														
Sec 05 T 21N R 16E SLBM *LOT 19														
Sec 05 T 21N R 16E SLBM *LOT 20														

GROU

OTHER COMMENTS

This right is limited to the annual depletion of 1601.46 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 91-5075, with Appl#: A30414dw1a, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	2625.398	525.5000						

**********END OF DATA**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-43** APPLICATION/CLAIM NO.: **A4792** CERT. NO.: 224

OWNERSHIP

NAME: Chris Dunham
ADDR: PO Box 193
Green River UT 84525
INTEREST: 20%
REMARKS: 12 cfs: 1/5th interest

NAME: Howard Hastings
ADDR: Green River UT 84525
INTEREST: 60%
REMARKS: 36 cfs

NAME: H. Clark Ross
ADDR: 10675 South Haven Street
Las Vegas NV 89183
INTEREST: 20%
REMARKS: 12 cfs

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 07/29/1912|PRIORITY: 07/29/1912|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:05/05/1913|PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-7]|MAP: [6d]|PUB DATE: 06/01/1978

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 60.0 cfs
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1840 ft W 150 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 616398.

POWER: Unnamed Hydro-Electric Power Plant, rated at 7 KW. PERIOD OF USE: 01/01 TO 12/31
CFS Contributed by this Right for this Use: 43438.79882

**********END OF DATA**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-74** APPLICATION/CLAIM NO.: **D2235** CERT. NO.:

OWNERSHIP

NAME: Chris Dunham
ADDR: P.O. Box 193
Green River, Utah 84525
INTEREST: 20%
REMARKS: 16.48 acres

NAME: Howard Hastings
ADDR: Green River UT 84525
INTEREST: 60%
REMARKS: 49.44 acres

NAME: H. Clark Ross
ADDR: 10675 South Haven Street
Las Vegas NV 89183
INTEREST: 20%
REMARKS: 16.48 acres

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 10/09/1969|PRIORITY: / /1879|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [ ]|ActionDate: |PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-7]|MAP: [6d]|PUB DATE: 06/01/1978

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Diligence Claim Source of Info: Proposed Determination **Status:**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 5.0 cfs
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1840 ft W 150 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 616623.

IRRIGATION: 82.4 acres PERIOD OF USE: 04/01 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 16 T 20S R 16E SLBM	3.0000		41.2000	10.6000					19.1000	0.3000				
Sec 17 T 20S R 16E SLBM						0.5000		7.7000						

GROU

END OF DATA

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-620** APPLICATION/CLAIM NO.: **F70415** CERT. NO.: CERTIFICAT

OWNERSHIP

NAME: Sequoiadendron, LLC
ADDR: 108 West 13th Street
Wilmington, Delaware 19801

DATES, ETC.

LAND OWNED BY APPLICANT? Yes COUNTY TAX ID#:
FILED: 10/02/1996|PRIORITY: 10/02/1996|PUB BEGAN: 10/22/1996|PUB ENDED: 10/29/1996|NEWSPAPER: Emery County Progress
ProtestEnd:11/18/1996|PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:01/29/1997|EXTENSION:
LAP, ETC: 01/29/2017|LAPS LETTR: |RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]

TYPE -- DOCUMENT -- STATUS

Type of Right: Fixed-Time Application Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT* (Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 2.71 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 5 mi. North of Green River

POINT OF DIVERSION -- SURFACE:
(1) N 1809 ft W 210 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 616589.

IRRIGATION: 0.43 acres PERIOD OF USE: 03/15 TO 11/15

STOCKWATER: 20.0000 Stock Units PERIOD OF USE: 01/01 TO 12/31

###PLACE OF USE:

	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 17 T 20S R 16E SLBM														

GROU

PLACE OF USE for STOCKWATERING

	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 17 T 20S R 16E SLBM	* : : : *	* : : : *	* : : : *	* : : : X*

OTHER COMMENTS

This right is only approved for a fixed-time of 20 years (01/29/2017).This date is subject to possible extension under Section 73-3-8 of the Utah Code Annotated, (1989 & Supp. 1998).

E N D O F D A T A

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-657** APPLICATION/CLAIM NO.: **A30414dwc** CERT. NO.: CERTIFICAT
CHANGES: a27713c (Filed: 04/04/2003) Amended by Subsequent Change
a35183 (Filed: 12/24/2008) Certificate (Issued: 04/14/2010)

OWNERSHIP

NAME: J. D. Banasky
ADDR: P. O. Box 728
Price, UT 84501

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: 10/29/2009|ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 04/14/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:
TYPE -- DOCUMENT -- STATUS
Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 801.5946 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 3 miles N of Green River City

POINT OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 629819.

IRRIGATION: 131.884 acres PERIOD OF USE: 03/15 TO 11/15

OTHER: Maintenance of three storage reservoirs inundating 3.116 acres. PERIOD OF USE: 01/01 TO 12/31
Acre Feet Contributed by this Right for this Use: 10.2906

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE
Sec 32 T 20S R 16E SLBM	*					X			*					
Sec 32 T 20S R 16E SLBM *LOT 10														
Sec 32 T 20S R 16E SLBM *LOT 11														
Sec 32 T 20S R 16E SLBM *LOT 12														
Sec 32 T 20S R 16E SLBM *LOT 14														
Sec 32 T 20S R 16E SLBM *LOT 9														
Sec 33 T 20S R 16E SLBM	*X				*				*X				*	
Sec 33 T 20S R 16E SLBM *LOT 4														
Sec 03 T 21S R 16E SLBM *LOT 25														

GROU

Storage from 01/01 to 12/31, inclusive, in Pond #1 with a maximum capacity of 4.050 acre-feet, located in:

	Height of Dam:	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
	Area Inundated: 1.15	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 32 T 20S R 16E SLBM		*LOT 12			

Storage from 01/01 to 12/31, inclusive, in Pond #2 with a maximum capacity of 4.600 acre-feet, located in:

	Height of Dam:	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
	Area Inundated: 1.31	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 32 T 20S R 16E SLBM		*LOT 10			
Sec 32 T 20S R 16E SLBM		*LOT 11			
Sec 32 T 20S R 16E SLBM		*LOT 12			
Sec 32 T 20S R 16E SLBM		*LOT 9			

Storage from 01/01 to 12/31, inclusive, in Pond #3 with a maximum capacity of 2.260 acre-feet, located in:

	Height of Dam:	NORTH-WEST¼	NORTH-EAST¼	SOUTH-WEST¼	SOUTH-EAST¼
	Area Inundated: 0.64	NW NE SW SE	NW NE SW SE	NW NE SW SE	NW NE SW SE
Sec 32 T 20S R 16E SLBM		*LOT 10			
Sec 32 T 20S R 16E SLBM		*LOT 11			

Small Dam Required?: No

OTHER COMMENTS

This right is limited to the annual depletion of 412.2071 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING ACRE-FEET	POWER ACRE-FEET	OTHER ACRE-FEET
	675.9588	135.3000						

END OF DATA

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-661** APPLICATION/CLAIM NO.: **A30414dwg** CERT. NO.: CERTIFICAT
CHANGES: a27713g (Filed: 04/04/2003) Certificate (Issued: 04/14/2010)

OWNERSHIP

NAME: Glen Clark or Ester Clark
ADDR: P. O. Box 352
Green River, UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 04/14/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 32.82 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 4 miles N of Green River City

POINT OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 629610.

IRRIGATION: 5.47 acres PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 29 T 20S R 16E SLBM	*LOT 6													
Sec 29 T 20S R 16E SLBM	*LOT 7													

GROU

OTHER COMMENTS

This right is limited to the annual depletion of 16.6698 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN	QUANTITY IN *WATER USES*						
CFS	ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					(*----------ACRE-FEET----------*)			
	27.3281	5.4700						

**********E N D O F D A T A**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-656** APPLICATION/CLAIM NO.: **A30414dwb** CERT. NO.: CERTIFICAT
CHANGES: a27713b (Filed: 12/24/2008) Amended by Subsequent Change
a35181 (Filed: 12/24/2008) Amended by Subsequent Change
a36057 (Filed: 11/03/2009) Certificate (Issued: 07/21/2010)

OWNERSHIP

NAME: Chris Dunham
ADDR: P. O. Box 193
Green River, UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: 10/29/2009|ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 07/21/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:
TYPE -- DOCUMENT -- STATUS
Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 521.82 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 6.5 mi. N of Green River City

POINTS OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:
(2) N 1924 ft W 145 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Pump to irrigation line Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 630527. Water Rights Appurtenant to the following use(s):
92-656(CERT),667(CERT)

IRRIGATION: Sole Supply: 86.97 acres of the Group Total of 98.36 PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 16 T 20S R 16E SLBM				23.1700						32.2800	16.3900	16.6500		
Sec 16 T 20S R 16E SLBM *LOT 2														
Sec 16 T 20S R 16E SLBM *LOT 5														

GROU

OTHER COMMENTS

This right is limited to the annual depletion of 265.0411 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	434.5021	86.9700						

PROTESTANTS

NAME: United States Bureau of Reclamation NAME:
ADDR: c/o Bruce C. Barrett ADDR:
302 East 1860 South
Provo, UT 84606-7317

**********END OF DATA**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-667** APPLICATION/CLAIM NO.: **A30414dwi** CERT. NO.: CERTIFICAT
CHANGES: a27713i (Filed: 04/04/2003) Amended by Subsequent Change
a36057 (Filed: 11/03/2009) Certificate (Issued: 07/21/2010)

OWNERSHIP

NAME: Chris Dunham
ADDR: P. O. Box 193
Green River, UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 11/02/2009|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [ ]|ActionDate: |PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:11/02/2009|CERT/WUC: 07/21/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 68.34 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 6.5 mi. N of Green River City

POINTS OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:
(2) N 1924 ft W 145 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Pump to irrigation line Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 630527. Water Rights Appurtenant to the following use(s):
92-656(CERT),667(CERT)

IRRIGATION: Sole Supply: 11.39 acres of the Group Total of 98.36 PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 16 T 20S R 16E SLBM				23.1700						32.2800	16.3900	16.6500		
Sec 16 T 20S R 16E SLBM *LOT 2														
Sec 16 T 20S R 16E SLBM *LOT 5														

GROU

OTHER COMMENTS

This right is limited to the annual depletion of 34.7111 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dwi, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					ACRE-FEET			
	491.4066	98.3600						

Seg'd for proof to be filed

**********END OF DATA**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-660** APPLICATION/CLAIM NO.: **A30414dwf** CERT. NO.: CERTIFICAT
CHANGES: a27713f (Filed: 04/04/2003) Certificate (Issued: 04/14/2010)

OWNERSHIP

NAME: Kirk and Paula Dunham
ADDR: P. O. Box 540
Green River, UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 04/14/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

TYPE -- DOCUMENT -- STATUS

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 86.64 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 5.5 mi. N of Green River City

POINT OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 629571.

IRRIGATION: 14.44 acres PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:

	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 21 T 20S R 16E SLBM			14.4400											

GROU

DIVERSION & DEPLETION ESTIMATES

(All values in acre-feet, Growing Season in days)

	IRRIGATION	STOCK	DOMESTIC	MUNICIPAL	MINING	POWER	OTHER	MANUALLY EVALUATED	ACRE-FEET EXPORTED	DIVERSION DUTY	DEPLETION DUTY	GROWING SEASON	WATER-USE REPORTING
DIV:	72.200							No		5.00	3.05	157	
DEP:	43.982												

OTHER COMMENTS

This right is limited to the annual depletion of 44.0059 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	72.1422	14.4400						

(WATER USES: MUNICIPAL, MINING, POWER, OTHER in ACRE-FEET)

E N D O F D A T A

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-659** APPLICATION/CLAIM NO.: **A30414dwe** CERT. NO.: CERTIFICAT
CHANGES: a27713e (Filed: 04/04/2003) Certificate (Issued: 04/14/2010)

OWNERSHIP

NAME: Nancy Dunham
ADDR: P. O. Box 540
Green River, UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: 10/29/2009|ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 04/14/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 522.6 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 6 miles N of Green River City

POINT OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 629570.

IRRIGATION: 87.1 acres PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 16 T 20S R 16E SLBM											X	X		
Sec 21 T 20S R 16E SLBM	X	X												

GROU

OTHER COMMENTS

This right is limited to the annual depletion of 265.4373 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	435.1516	87.1000						

**********E N D O F D A T A**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-658** APPLICATION/CLAIM NO.: **A30414dwd** CERT. NO.: CERTIFICAT
CHANGES: a27713d (Filed: 04/04/2003) Certificate (Issued: 04/14/2010)

OWNERSHIP

NAME: Harold W. Nelson
ADDR: P. O. Box 516
Green River, UT 84525

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2008|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:04/06/2009|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:12/24/2008|CERT/WUC: 04/14/2010|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

TYPE -- DOCUMENT -- STATUS
Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 37.26 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 5.5 mi. N of Green River City

POINT OF DIVERSION -- SURFACE:
(1) N 1914 ft W 148 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: East Side Canal Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 629572.

IRRIGATION: 6.21 acres PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS		
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	
Sec 21 T 20S R 16E SLBM				6.2100											

GROU

OTHER COMMENTS

This right is limited to the annual depletion of 18.9250 acre-feet.

SEGREGATION HISTORY

This Right was Segregated from 92-638, with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	31.0252	6.2100						

E N D O F D A T A

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-633** APPLICATION/CLAIM NO.: **A30414dp** CERT. NO.:
CHANGES: a26231 (Filed: 12/24/2001) Amended by Subsequent Change
t31872 (Filed: 08/24/2006) Lapsed
a31873 (Filed: 08/24/2006) Approved
a36972 (Filed: 11/04/2010) Unapproved

OWNERSHIP

NAME: Eastside High Ditch Irrigation Company
ADDR: Attn: Tim Vetere
P.O. Box 404
Green River UT 84525

NAME: State of Utah Board of Water Resources
ADDR: Box 146201
Salt Lake City UT 84114-6201

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 12/24/2001|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:10/06/1959|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:01/28/2009|CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]|50YR DATE: 10/06/2009
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Application to Segregate **Status: Approved**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 4900.0 acre-feet
SOURCE: Green River
COUNTY: Daggett COMMON DESCRIPTION: Flaming Gorge Dam

POINTS OF DIVERSION -- SURFACE:
(1) S 56 ft E 105 ft from N4 cor, Sec 16, T 20S, R 16E, SLBM
Diverting Works: Pump & Pipeline Source: Green River
(2) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family**

SUPPLEMENTAL GROUP NO.: 631588.
IRRIGATION: Sole Supply: 980.0 acres of the Group Total of 1560.0 PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE
Sec 10 T 20S R 16E SLBM	*				*				*		X		*	
Sec 15 T 20S R 16E SLBM	*X	X	X	X	*				*X	X	X	X	*X	X
Sec 16 T 20S R 16E SLBM	*X	X	X	*X	X	X	X	*X	X	X	X	X	*X	X
Sec 21 T 20S R 16E SLBM	*X	X	X	X	*X	X	X	X	*	X	X	X	*X	X
Sec 22 T 20S R 16E SLBM	*X	X			*X	X			*				*	
Sec 26 T 20S R 16E SLBM	*X	X	X	X	*X	X	X	X	*X	X	X	X	*X	X
Sec 27 T 20S R 16E SLBM	*X		X		*	X	X		*X	X	X	X	*X	X
Sec 28 T 20S R 16E SLBM	*				*	X		X	*				*	X

GROU

SEGREGATION HISTORY

This Right was Segregated from 41-3479 , with Appl#: A30414dp, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	4900.0	980.0000						

Segregated portion of Flaming Gorge Water.

APPLICATIONS FOR EXTENSIONS OF TIME WITHIN WHICH TO SUBMIT PROOF

FILED: 02/04/1999|PUB BEGAN: 02/24/1999|PUB ENDED: 03/03/1999|NEWSPAPER: Vernal Express
ProtestEnd:03/23/1999|PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:05/13/1999|PROOF DUE: 10/31/2009

END OF DATA

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-4** APPLICATION/CLAIM NO.: **A795** CERT. NO.: 1244

OWNERSHIP

NAME: East Side Irrigation Company
ADDR: C/O Howard Silliman
Green River UT 84525
INTEREST: 100%

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 02/08/1906|PRIORITY: 02/08/1906|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:12/31/1906|PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: 01/13/1923|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-7]|MAP: [6d]|PUB DATE: 06/01/1978

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 6.33 cfs
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 616367.

IRRIGATION: 277.9 acres PERIOD OF USE: 03/15 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 21 T 20S R 16E SLBM			22.4000	6.2000										
Sec 28 T 20S R 16E SLBM	1.8000													
Sec 29 T 20S R 16E SLBM														
Sec 32 T 20S R 16E SLBM					16.5000	40.0000	25.2000	35.7000					11.0000	39.4000
Sec 33 T 20S R 16E SLBM	6.2000		22.5000						8.3000		6.2000			

GROU

**********E N D O F D A T A**********

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-638** APPLICATION/CLAIM NO.: **A30414dw** CERT. NO.:
CHANGES: a27713 (Filed: 04/03/2003) Approved

OWNERSHIP

NAME: Gunnison Butte Mutual Irrigation Company
ADDR: P.O. Box 447
Green River UT 84525

NAME: State of Utah Board of Water Resources
ADDR: Box 146201
Salt Lake City UT 84114-6201

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 02/28/2000|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:10/06/1959|PROOF DUE: 10/31/2020
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:10/30/2008|CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]|50YR DATE: 10/06/2009
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Application to Segregate **Status: Approved**

LOCATION OF WATER RIGHT***(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER*****GOOGLE VIEW***

FLOW: 8238.9054 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: Flaming Gorge Dam

POINTS OF DIVERSION -- SURFACE:

(1) N 621 ft W 847 ft from SE cor, Sec 09, T 20S, R 16E, SLBM
Diverting Works: Crovo Pump Source:
(2) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Eastside Diversion Source:
(3) N 2090 ft W 1670 ft from E4 cor, Sec 03, T 21S, R 16E, SLBM
Diverting Works: Bookcliff Pump Source:
(4) S 1890 ft E 1380 ft from NW cor, Sec 15, T 21S, R 16E, SLBM
Diverting Works: Vetere Pump Source:
(5) S 1420 ft W 2661 ft from NE cor, Sec 34, T 21S, R 16E, SLBM
Diverting Works: Quinn Pump Source:
(6) N 1285 ft W 2647 ft from SE cor, Sec 16, T 22S, R 16E, SLBM
Diverting Works: Uptain Pump Source:
(7) S 4051 ft W 2638 ft from NE cor, Sec 28, T 22S, R 16E, SLBM
Diverting Works: G. Dunham Pump Source:
(8) S 2723 ft W 2738 ft from NE cor, Sec 31, T 23S, R 17E, SLBM
Diverting Works: Ruby Ranch Pump Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 631169.

IRRIGATION: Sole Supply: 1472.3817 acre of the Group Total of 2450.1617 PERIOD OF USE: 04/01 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE	SW	SE	* NW	NE
Sec 09 T 20S R 16E SLBM	*LOT 7													
Sec 16 T 20S R 16E SLBM	*				*				*		X	X	*	
Sec 21 T 20S R 16E SLBM	*X	X	X		*				*				*	
Sec 29 T 20S R 16E SLBM	*LOT 6													
Sec 29 T 20S R 16E SLBM	*LOT 7													
Sec 32 T 20S R 16E SLBM	*				*X	X	X	X	*				*X	X
Sec 33 T 20S R 16E SLBM	*				*				*X	X	X	X	*	
Sec 01 T 21S R 16E SLBM	*				*				*X	X	X	X	*X	X
Sec 01 T 21S R 16E SLBM	*LOT 17													
Sec 01 T 21S R 16E SLBM	*LOT 18													
Sec 01 T 21S R 16E SLBM	*LOT 19													
Sec 01 T 21S R 16E SLBM	*LOT 20													
Sec 03 T 21S R 16E SLBM	*				*X	X	X	X	*				*	
Sec 11 T 21S R 16E SLBM	*				*X	X	X	X	*				*X	X
Sec 12 T 21S R 16E SLBM	*X	X	X	X	*X	X	X	X	*X	X	X	X	*X	
Sec 13 T 21S R 16E SLBM	*				*X	X			*				*	
Sec 15 T 21S R 16E SLBM	*				*		X	X	*				*X	
Sec 34 T 21S R 16E SLBM	*LOT 2													
Sec 05 T 21S R 17E SLBM	*				*				*X	X	X	X	*X	X
Sec 06 T 21S R 17E SLBM	*				*				*				*X	X

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 Sec 06 T 21S R 17E SLBM *LOT 15
 Sec 06 T 21S R 17E SLBM *LOT 16
 Sec 07 T 21S R 17E SLBM *_______|X      |_______|X      *X      |X      |X      |X      *_______|X      |_______|X      *X      |X      |
 Sec 07 T 21S R 17E SLBM *LOT 1
 Sec 07 T 21S R 17E SLBM *LOT 2
 Sec 07 T 21S R 17E SLBM *LOT 3
 Sec 08 T 21S R 17E SLBM *X      |X      |X      |X      *_______|_______|_______|_______*_______|_______|_______|_______*_______|_______|
 Sec 16 T 22S R 16E SLBM *LOT 10
 Sec 16 T 22S R 16E SLBM *LOT 8
 Sec 16 T 22S R 16E SLBM *LOT 9
 Sec 28 T 22S R 16E SLBM *LOT 10
 Sec 28 T 22S R 16E SLBM *LOT 9
 Sec 32 T 23S R 17E SLBM *X      |X      |X      |X      *X      |X      |X      |X      *_______|_______|_______|_______*_______|_______|
                                                                                                                                        GROU
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OTHER COMMENTS

See Memo to File dated 9/26/2012 for quantification of right.

GENERAL:
The water under this application was originally allocated to the Flaming Gorge Project. It was not developed and was eventually assigned to the Board of Water Resources. The applicant, by Contract and Assignment, received the right to divert 24825 acre-feet of water to irrigate 6206.25 acres. It was originally thought that a portion of the water should be used supplementally with existing rights. Now that the project is being refined, all of the water will be used on new land.
Using the depletion limit of 15143 acre-feet, and 3.0475 acre-feet depletion/acre of land, it was determined that 4969 acres of land could be irrigated under the contract. The annual diversion duty is 4.996 acre-feet/acre. Therefore, the hereafter portion of the change application is based on the above acreage, the depletion/acre, and the diversion/acre. The depletion figures were taken from Research Report #145, Consumptive Use of Irrigated Crops in Utah, using the Green River data on page 212.
The annual depletion under this application is limited to 10100.33 acre-feet of water.
The water rights associated with the contract and original assignment and segregation under 41-3531 (A30414dw) have now been further segregated and changed to 92-638 (A30414dw)a27713; 91-5075 (A30414dw1) a27714; 93-3750 (A30414dw2) a27715.

SEGREGATION HISTORY

This Right was Segregated from 41-3531 , with Appl#: A30414dw, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	24825.0	4968.9800						

To change the drainage area number from 41-Area to the 92-Area.

The following Water Rights have been Segregated from 92-638:

(1) WRNUM: 91-5075 5788.9 1447.2200
APPL#: A30414dw1
NAME: State of Utah Board of Water Resources
FILED: 04/01/2003 STATUS: UNAP
APPR:
Together with 3531.14 acre-feet depletion

(2) WRNUM: 93-3750 2478.0 619.5000
APPL#: A30414dw2
NAME: State of Utah Board of Water Resources
FILED: 04/01/2003 STATUS: UNAP
APPR:
Together with 1511.56 acre-feet depletion

(3) WRNUM: 92-655 2196.3 366.0500
APPL#: A30414dwa
NAME: State Of Utah Board of Water Resources
FILED: 10/30/2008 STATUS: UNAP
APPR:
Together with 1115.5374 acre-feet depletion

(4) WRNUM: 92-657 801.5946 131.8840
APPL#: A30414dwc
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 412.2071 acre-feet depletion

(5) WRNUM: 92-659 522.6 87.1000
APPL#: A30414dwe
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 265.4373 acre-feet depletion

(6) WRNUM: 92-661 32.82 5.4700
APPL#: A30414dwg
NAME: Gunnison Butte Mutual Irrigation Company, et al.

FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 16.6698 acre-feet depletion

---

(7) WRNUM: 92-656 521.82 86.9700
APPL#: A30414dwb
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 265.0411 acre-feet depletion

---

(8) WRNUM: 92-658 37.26 6.2100
APPL#: A30414dwd
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 18.925 acre-feet depletion

---

(9) WRNUM: 92-660 86.64 14.4400
APPL#: A30414dwf
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 44.0059 acre-feet depletion

---

(10) WRNUM: 92-662 65.7 10.9500
APPL#: A30414dwh
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 12/24/2008 STATUS: UNAP
APPR:
Together with 33.3701 acre-feet depletion

---

(11) WRNUM: 92-667 68.34 11.3900
APPL#: A30414dwi
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 11/02/2009 STATUS: UNAP
APPR:
Together with 34.7111 acre-feet depletion

---

(12) WRNUM: 92-670 3761.12 940.2800
APPL#: A30414dwj
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 11/02/2010 STATUS: UNAP
APPR:

---

(13) WRNUM: 92-671 225.0 37.5000
APPL#: A30414dwk
NAME: Gunnison Butte Mutual Irrigation Company, et al.
FILED: 03/01/2011 STATUS: UNAP
APPR:

	CFS	ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					(*----------ACRE-FEET----------*)				
92-638 currently has: -		8238.9054	1204.0160						

PROTESTANTS

NAME: Green River Canal Company
ADDR: c/o Dean King
PO Box 84
Green River, UT 84525

NAME:
ADDR:

APPLICATIONS FOR EXTENSIONS OF TIME WITHIN WHICH TO SUBMIT PROOF

FILED: 10/29/2009|PUB BEGAN: 11/23/2010|PUB ENDED: 11/30/2010|NEWSPAPER: Emery County Progress
ProtestEnd:12/20/2010|PROTESTED: [No Hear]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:03/15/2011|PROOF DUE: 10/31/2020

END OF DATA

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-69** APPLICATION/CLAIM NO.: **A38290** CERT. NO.:
CHANGES: a6932 (Filed:) Water User's Claim (Issued:)

OWNERSHIP

NAME: T. J. Hastings
ADDR: Green River UT 84525
INTEREST: 100%

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 06/07/1967|PRIORITY: 06/07/1967|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [ ]|ActionDate:11/21/1967|PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-7]|MAP: [6d]|PUB DATE: 06/01/1978

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Proposed Determination **Status: Water User's Claim**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW***

FLOW: 1.0 cfs
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.)* ******** *EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 616620.

IRRIGATION: 39.7 acres PERIOD OF USE: 04/01 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 17 T 20S R 16E SLBM														
Sec 20 T 20S R 16E SLBM						16.2000								

GROU

END OF DATA

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-21** APPLICATION/CLAIM NO.: **A11251** CERT. NO.: 2364

OWNERSHIP

NAME: Bruce E. and Dorothy R. Nelson
ADDR: P. O. Box 307
Green River UT 84525
INTEREST: 100%
REMARKS: (joint tenants)

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 05/16/1932|PRIORITY: 05/16/1932|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:08/10/1933|PROOF DUE:
EXTENSION: |ELEC/PROOF:[ ]|ELEC/PROOF: |CERT/WUC: |LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-7]|MAP: [6d]|PUB DATE: 06/01/1978

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Water User's Claim **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 1.5 cfs
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family**

SUPPLEMENTAL GROUP NO.: 616229.

IRRIGATION: Sole Supply: 97.0 acres of the Group Total of 99.4 PERIOD OF USE: 03/01 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS			
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE		
Sec 21 T 20S R 16E SLBM									42.7000	26.4000	30.3000					

GROU

****
**********E N D O F D A T A**********
****

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-646** APPLICATION/CLAIM NO.: **A30414ddb** CERT. NO.: CERTIFICAT
CHANGES: a21692 (Filed: 11/18/1997) Amended by Subsequent Change
a24470 (Filed: 05/10/2000) Withdrawn
a30882 (Filed: 12/15/2005) Withdrawn
a31738 (Filed: 07/19/2006) Certificate (Issued: 05/09/2012)

OWNERSHIP

NAME: State of Utah School and Institutional Trust Lands Administration
ADDR: 675 East 500 South, Suite 500
Salt Lake City, UT 84102-2810

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 11/17/1997|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER:
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:10/06/1959|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:10/01/2008|CERT/WUC: 05/09/2012|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT***(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 526.12 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION:

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family***

SUPPLEMENTAL GROUP NO.: 616614. Water Rights Appurtenant to the following use(s):
92-645(CERT),**646(CERT)**

IRRIGATION: Sole Supply: 87.6866 acres of the Group Total of 96.33333 PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 23 T 20S R 16E SLBM											X			
Sec 26 T 20S R 16E SLBM	X													
Sec 27 T 20S R 16E SLBM				X	X		X							

GROU

SEGREGATION HISTORY

This Right was Segregated from 41-3491 , with Appl#: A30414dd, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
					ACRE-FEET			
	526.12							

To be used for a Development Project at Bullfrog.

APPLICATIONS FOR EXTENSIONS OF TIME WITHIN WHICH TO SUBMIT PROOF

FILED: 06/25/2001|PUB BEGAN: 01/03/2002|PUB ENDED: 01/10/2002|NEWSPAPER: Garfield County News
ProtestEnd:01/30/2002|PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:03/28/2002|PROOF DUE: 10/31/2003

FILED: 10/29/2003|PUB BEGAN: 12/04/2003|PUB ENDED: 12/11/2003|NEWSPAPER: Garfield County News
ProtestEnd:12/31/2003|PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:01/15/2004|PROOF DUE: 10/31/2005

FILED: 10/31/2005|PUB BEGAN: 12/08/2005|PUB ENDED: 12/15/2005|NEWSPAPER: The Garfield County Insider
ProtestEnd:01/04/2006|PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:05/24/2006|PROOF DUE: 10/31/2009

****
**********E N D O F D A T A**********
****

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-645** APPLICATION/CLAIM NO.: **A30414dd** CERT. NO.: CERTIFICAT
CHANGES: a30882 (Filed: 12/15/2005) Withdrawn
a31738 (Filed: 07/19/2006) Certificate (Issued: 05/09/2012)

OWNERSHIP

NAME: State of Utah School and Institutional Trust Lands Administration
ADDR: 675 East 500 South, Suite 500
Salt Lake City, UT 84102-2810

DATES, ETC.

LAND OWNED BY APPLICANT? COUNTY TAX ID#:
FILED: 04/23/1997|PRIORITY: 08/07/1958|PUB BEGAN: |PUB ENDED: |NEWSPAPER: No Adv Required
ProtestEnd: |PROTESTED: [No]|HEARNG HLD: |SE ACTION: [Approved]|ActionDate:10/06/1959|PROOF DUE: 10/31/2009
EXTENSION: |ELEC/PROOF:[Proof]|ELEC/PROOF:10/01/2008|CERT/WUC: 05/09/2012|LAP, ETC: |LAPS LETTER:
RUSH LETTR: |RENOVATE: |RECON REQ: |TYPE: [ ]
PD BOOK: [92-]|MAP: [ ]|PUB DATE:

***TYPE -- DOCUMENT -- STATUS**

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT*(Points of Diversion: Click on Location to access PLAT Program.)********MAP VIEWER***GOOGLE VIEW***

FLOW: 51.88 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: Flaming Gorge Dam

POINT OF DIVERSION -- SURFACE:
(1) N 1920 ft W 80 ft from SE cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Source:

Stream Alt Required?: No

USES OF WATER RIGHT****** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 616614. Water Rights Appurtenant to the following use(s):
92-645(CERT),646(CERT)

IRRIGATION: Sole Supply: 8.6467 acres of the Group Total of 96.33333 PERIOD OF USE: 03/15 TO 11/15

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 23 T 20S R 16E SLBM											X			
Sec 26 T 20S R 16E SLBM	X													
Sec 27 T 20S R 16E SLBM				X	X		X	X						

GROU

SEGREGATION HISTORY

This Right was Segregated from 41-3479 , with Appl#: A30414d, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	WATER USES: IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING ACRE-FEET	POWER	OTHER
	600.0							600.00000

The following Water Rights have been Segregated from 92-645:

(1) WRNUM: 97-2132 12.0 12.00000
APPL#: A30414dda
NAME: School and Institutional Trust Lands Administration
FILED: 09/08/1997 STATUS: APP
APPR: 11/28/1997
marina; change a21514; 2.4 AF depletion

(2) WRNUM: 97-2138 526.12 526.12000
APPL#: A30414ddb
NAME: School and Institutional Trust Lands Administration
FILED: 11/17/1997 STATUS: APP
APPR: 05/04/1998
golf course & resort; change a21692; 505.224 AF depleted (See change.)

(3) WRNUM: 97-2312 10.0 10.00000
APPL#: A30414ddc
NAME: State of Utah Board of Water Resources, et al.
FILED: 06/20/2007 STATUS: UNAP
APPR:

	CFS	ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
						(*----------ACRE-FEET----------*)			
92-645 currently has: -		51.88	ERROR						51.88000

All IRR-WR but NOT SE has been SEGREGATED OFF.
All OTHER has been SEGREGATED OFF.

**********END OF DATA**********

Utah Division of Water Rights

Select Related Information

(WARNING: Water Rights makes NO claims as to the accuracy of this data.) RUN DATE: 10/02/2013

WATER RIGHT: **92-622** APPLICATION/CLAIM NO.: **A30414da** CERT. NO.: CERTIFICAT

CHANGES: t21183 (Filed: 06/04/1997) Lapsed
a21924 (Filed: 02/10/1998) Certificate (Issued: 02/24/2011)

OWNERSHIP

NAME: Eastside High Ditch Irrigation Company
ADDR: c/o Tim Vetere, Agent
P O Box 404
Green River UT 84525

NAME: State of Utah Board of Water Resources
ADDR: 1594 West North Temple, Ste 310
Salt Lake City UT 84114-6201

DATES, ETC.

```
LAND OWNED BY APPLICANT?                    COUNTY TAX ID#:
FILED:     11/18/1996|PRIORITY:  08/07/1958|PUB BEGAN:           |PUB ENDED:           |NEWSPAPER:
ProtestEnd:          |PROTESTED: [No      ]|HEARNG HLD:          |SE ACTION: [Approved]|ActionDate:09/19/1997|PROOF DUE:  07/31/2004
EXTENSION:           |ELEC/PROOF:[Proof   ]|ELEC/PROOF:07/13/2004|CERT/WUC:  02/24/2011|LAP, ETC:             |LAPS LETTER:
RUSH LETTR:          |RENOVATE:            |RECON REQ:           |TYPE: [             ]
PD BOOK: [  92-     ]|MAP:  [             ]|PUB DATE:
```

*TYPE -- DOCUMENT -- STATUS

Type of Right: Application to Appropriate Source of Info: Certificate **Status: Certificate**

LOCATION OF WATER RIGHT***(Points of Diversion: Click on Location to access PLAT Program.)*********MAP VIEWER***GOOGLE VIEW*

FLOW: 3480.0 acre-feet
SOURCE: Green River
COUNTY: Grand COMMON DESCRIPTION: 6 miles N of Green River

POINT OF DIVERSION -- SURFACE:
(1) S 671 ft W 21 ft from E4 cor, Sec 17, T 20S, R 16E, SLBM
Diverting Works: Existing diversion dam, headgate, earthen canal Source: Green River

Stream Alt Required?: No

USES OF WATER RIGHT******** *ELU -- Equivalent Livestock Unit (cow, horse, etc.) ******** EDU -- Equivalent Domestic Unit or 1 Family*

SUPPLEMENTAL GROUP NO.: 616591.

IRRIGATION: 580.0 acres PERIOD OF USE: 03/15 TO 10/31

###PLACE OF USE:	NORTH WEST QUARTER				NORTH EAST QUARTER				SOUTH WEST QUARTER				SOUTH EAS	
	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE	SW	SE	NW	NE
Sec 21 T 20S R 16E SLBM						X		X						X
Sec 22 T 20S R 16E SLBM	X	X	X	X			X	X	X	X	X	X	X	X
Sec 23 T 20S R 16E SLBM									X		X			
Sec 27 T 20S R 16E SLBM	X	X												
Sec 28 T 20S R 16E SLBM						X								

GROU

SEGREGATION HISTORY

This Right was Segregated from 41-3479, with Appl#: A30414d, Approval Date: 10/06/1959 under which Proof is to be submitted.
This Right as originally filed:

FLOW IN CFS	QUANTITY IN ACRE-FEET	IRRIGATED ACREAGE	STOCK (ELUs)	DOMESTIC (FAMILIES)	MUNICIPAL	MINING	POWER	OTHER
	2900.0	580.0000						

(WATER USES; MUNICIPAL, MINING, POWER, OTHER in ACRE-FEET)

APPLICATIONS FOR EXTENSIONS OF TIME WITHIN WHICH TO SUBMIT PROOF

```
FILED:     05/17/2001|PUB BEGAN: 05/31/2001|PUB ENDED: 05/09/2001|NEWSPAPER: The Times-Independent
ProtestEnd:06/27/2001|PROTESTED: [No      ]|HEARNG HLD:          |SE ACTION: [Approved]|ActionDate:08/08/2001|PROOF DUE:  07/31/2004
```

E N D O F D A T A

TECHNICAL MEMORANDUM

McMILLEN, LLC

To:	Bronson Smart (NRCS) Tony Beals (NRCS)	Project:	Green River Diversion Rehabilitation
From:	Greg Allington Aimee Hill	Cc:	Floyd Johnson (BLM) Dana Truman (BLM) File
Date:	March 6, 2014	Job No:	
Subject:	BLM Plant Survey		
Attachments:	Figure 1 – Vicinity Map		

1.0 INTRODUCTION

The Natural Resources Conservation Service (NRCS) is working with the Utah Department of Agriculture and Food (UDAF) as the project sponsor, through the Emergency Watershed Protection (EWP) Program, to rehabilitate the existing Green River Diversion (Diversion) to continue to provide water delivery to water rights holders.

Flooding in 2011 heightened concerns that a catastrophic failure of the diversion could result in significant losses to the local agricultural economy. The effects of recent flooding include cracking and chipping of concrete, undercutting of the downstream foundation sediments, and cracks associated with structural failure. This damage prompted the Green River Conservation District and, subsequently UDAF, to move forward with plans to rehabilitate the existing Green River Diversion Dam, also known as the Tusher Diversion Dam.

The Bureau of Land Management (BLM) is considered a Cooperating Agency on the project and therefore has been involved in the project since construction activities will occur on land managed by the BLM. McMillen, LLC (McMillen) and the NRCS met with Dana Truman of the BLM Price Field Office on February 6, 2014 to conduct a preliminary plant survey on the BLM-managed property west of the project site (Figure 1). Staging and access roads are proposed on the west side of the diversion for access during construction. This technical memorandum describes the results of initial coordination with BLM and the preliminary plant survey.

2.0 BLM SENSITIVE SPECIES

Species designated by BLM as sensitive species are native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either:

- There is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a

distinct population segment of the species is at risk across all or a significant portion of the species range(BLM Manual 6840, Special Status Species Management), or

- The species depends upon ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk (BLM Manual 6840, Special Status Species Management).

The following species are listed as sensitive by the BLM in Emery County (BLM 2011):

Table 1. BLM Sensitive Species, Emery County, Utah

Scientific Name	Common Name	Likely In Project Area
Alicielia tenuis	Mussentuchit gilia	No
Astragalus pubentissimus	Green River milk-vetch	Possible
Camissonia bolanderi	Bolander's camissonia	No
Crytantha creutzfeldtii	Creutzfeldt flower	No
Erigeron maguire	Maguire's daisy	No
Eriogonum corymbosum	Cronquist's buckwheat	No
Euphorbia nephradenia	Utah spurge	No
Lygodesmia grandiflora	Dolores rushpink	No
Mentzelia multicaulis	Horse Canyon stickleaf	No
Oreoxis trotteri	Trotter's alpineparsley	No
Psorothamnus polydenius	Jones indigo bush	Possible
Sphaeralcea psoraloides	Psoralea globemallow	No
Talinum thompsonii	Thompson's talinum	No

3.0 CONCLUSIONS AND RECOMMENDATIONS

The site visit with the BLM verified that the **Jones indigo-bush** is not in the project area likely due to 1) no observed presence of the species, 2) non-preferred soils, and 3) proximity to the Green River and associated flooding activity. In addition to the site visit, Dana Truman with BLM completed a site visit at a known population (outside the project study area) on February 6, 2014 that is located within a mile of the Tusher Dam. Plants were readily observed at this site and were in healthy condition. (Truman 2014)

After further BLM review, the **Green River milk-vetch** could occur on the Book Cliffs near the project area but not within the project area itself due to lack of suitable habitat. Therefore, the species will not be affected by project construction activities. (Truman 2014)

There are several other species that are included on the Emery County list of BLM sensitive species; however, the BLM site visit confirmed that none of the other species listed are expected to be found in the project area. (Truman 2014)

Upon completion of the BLM site visit, the BLM concluded that there is no concern for BLM sensitive plants within the project area. Dana Truman recommended that clearing

the mature cottonwood trees within the project area be avoided if at all possible. (Truman 2014)

4.0 REFERENCES

BLM. 2011. BLM Sensitive Plant Species List for Utah, February 2011.

Truman, Dana. 2014. Green River Diversion Rehabilitation. Email Correspondence between Dana Truman (BLM) and Aimee Hill (McMillen) regarding BLM Sensitive Plan Species. February 10, 2014.

Figure 1. Green River Diversion Rehabilitation– BLM Plant Survey Area in Emery County, Utah

TECHNICAL MEMORANDUM

McMILLEN, LLC

To:	Bronson Smart (NRCS) Tony Beals (NRCS)	Project:	Green River Diversion Rehabilitation
From:	Greg Allington Aimee Hill	Cc:	File
Date:	March 6, 2014	Job No:	
Subject:	Preliminary Waters of the US Inventory		
Attachments:	Figure 1: Vicinity Map Figure 2: Soil - Prime & Unique Farmland Figure 3: Water Resources, Floodplains & Waters of the US Including Wetlands Figure 4: Preliminary Waters of the US and Wetland Inventory Overview Figure 5: Preliminary Waters of the US and Wetland Inventory A – Site Photographs		

1.0 INTRODUCTION

The Natural Resources Conservation Service (NRCS) is working with the Utah Department of Agriculture and Food (UDAF) as the project sponsor, through the Emergency Watershed Protection (EWP) Program, to rehabilitate the existing Green River Diversion (Diversion) to continue to provide water delivery to water rights holders.

Flooding in 2011 heightened concerns that a catastrophic failure of the diversion could result in significant losses to the local agricultural economy. The effects of recent flooding include cracking and chipping of concrete, undercutting of the downstream foundation sediments, and cracks associated with structural failure. This damage prompted the Green River Conservation District and, subsequently UDAF, to move forward with plans to rehabilitate the existing Green River Diversion Dam, also known as the Tusher Diversion Dam.

McMillen, LLC (McMillen) was retained by the NRCS to complete a waters of the US and wetland identification, evaluation, and delineation services at the diversion. This memorandum summarizes the results of the initial wetlands and waters of the US inventory for the Green River diversion Study Area (Figure 1). An official delineation of waters of the US and wetlands has not been performed for the project. The official delineation will be performed once the 2014 growing season has started.

1.1 Project Location and Site Description

The Green River watershed is nested within the larger Colorado River watershed, which serves about 27 million people and irrigates nearly 4 million acres of land across several states of the western United States. Surface waters of the Green River originate across a 40,500 square-mile basin that includes parts of Wyoming, Utah, and Colorado.

The Diversion is located on the Green River approximately 6 miles upstream of the town of Green River, Utah. The Diversion is adjacent to the Tusher Wash and is often referred to as the Tusher Diversion. The diversion structure spans the 750-foot width of the river and diverts water to water right holders on both sides of the river.

This report describes in detail the waters of the US and wetland features identified within the project boundaries via aerial photograph interpretation and site visits. The river channel and associated wetlands within the riparian fringe described in this report are preliminarily identified within the potential diversion rehabilitation construction boundaries, which will herein be referred to as the "Survey Area".

2.0 METHODOLOGY

Preliminary waters of the U.S. and wetland identification field work has occurred and includes documentation of winter wetland vegetation and hydrology. A field delineation will occur during the spring 2014 growing season. An official delineation report will be prepared during spring 2014 to meet U.S. Army Corps of Engineers (Corps) and State of Utah waters of the US and wetlands delineation requirements. The formal delineation will follow the guidance set forth in the following documents:

- 1987 USACE Wetland Delineation Manual (Environmental Laboratory 1987),
- 2010 USACE Regional Supplement to the USACE Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010),
- 2010 Field Indicators of Hydric Soils in the United States (NRCS 2010), and
- 2007 Clean Water Act Jurisdiction – Rapanos vs. United States and Carabell vs. United States (Rapanos 2007).

The wetland delineation manual and supplement listed above follow the three-parameter approach for making wetland determinations, such that positive indicators of wetlands must be present for each of the following parameters: 1) vegetation, 2) soils and 3) hydrology.

2.1 Document Review

A review of available documents pertaining to the project was conducted. This review assisted with directing the focus of the waters of the US and wetland delineation to potential critical aquatic features. The following documents were reviewed:

- Historical and current aerial photos,
- NRCS soil survey data (NRCS 2013) (Figure 2),
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps (USFWS 2013) (Figure 3),
- United States Geological Survey (USGS) 1:24,000-scale 7.5-minute topographic map (USGS 1983), and
- Other available general background information provided by NRCS and the Utah Automated Geographic Reference Center (UAGRC).

2.2 Preliminary Field Investigation

McMillen conducted a preliminary field inventory on February 6, 2014. The river and banks were frozen and snow covered, and hydrophytic vegetation was observed (remnant and dormant state). A full delineation of the Study Area will be conducted in spring 2014 during the plant growing season.

3.0 RESULTS

3.1 Document Review

3.1.1 Historical and Current Aerial Photographs

Aerial photographs dating back to 1997 indicate that conditions at the Diversion have not changed in 17 years that would indicate changes to hydrology patterns that could have altered waters of the US in the Study Area.

3.1.2 NRCS Soil Survey Data

Soil information presented in this section has been summarized from NRCS Web Soil Survey data. Soils in the Study Area (Figure 2) have been mostly derived from the Mancos Shale. In the Study Area portion of Grand County, two soil types are prevalent, including the Redbank-Flatnose families association, and the Toddler-Ravola-Glenton families association. Emery County soils in the area include Beebe loamy fine sand, Ferron-Green River-Rafael complex, Garley-Ravola-Huntsman complex, Hunting loam, strongly saline, Penner loam, and Vickel-Utaline-Persayo complex. The dominant soils within the Study Area are characteristic of river valleys and floodplains and occur at elevations comparable to the Diversion and surrounding area. These soils are briefly described in Table 1.

Table 1. NRCS Web Soil Survey Data

Name	Landform	Ecological Site	Slope (%)	Comment	Hydric Soil
Redbank-Flatnose Association	Flood plains	Greasewood and/or Coyote Willow	0 to 3	Comprised of nonsaline, porous fine sandy to gravelly loams. Occurs adjacent to the east bank of the river from 4,000 to 6,500 feet elevation. Hydric Rating = 5.	No
Toddler-Ravola-Glenton Families Association	Drainage ways, flood plains	Castle Valley Saltbush	0 to 3	Comprised of well-drained, nonsaline to slightly saline, silt loams and fine sandy loams. Hydric Rating = 0.	No
Ferron-Green River-Rafael Complex	Flood plains	Inland Saltgrass and Fremont Cottonwood	1 to 2	Comprised of poorly drained, nonsaline to moderately saline, very fine to fine sandy loams. Hydric Rating = 60.	Yes
Garley-Ravola-Huntsman Complex	Flood-plain Steps	Big Basin Sagebrush, Shadscale, and/or Black Greasewood	1 to 4	Comprised of well-drained, very slightly saline to moderately saline, clay, fine sandy, gravelly sandy clay, and gravelly fine sandy loams. Hydric Rating = 0.	No

Name	Landform	Ecological Site	Slope (%)	Comment	Hydric Soil
Vickel-Utaline-Persayo Complex	Pediments	Shadscale, Indian Ricegrass, and/or Mat Saltbush	8 to 45	Comprised of well-drained, nonsaline to slightly saline, gravelly or clay loams that occur between 4,000 and 6,400 feet elevation. Hydric Rating = 0.	No

Soil borings completed during preparation of a recent design report provided soil data from the surface to as deep as 54.5 feet at sites on and around the dam (Alpha Engineering Company 2010). Data confirmed that soils are a mixture of silty sand, sand with silt and gravel, and loose gravel with silt and sand. Some areas have sandstone boulders and cobbles in a silty sand matrix.

3.1.3 USFWS NWI Maps

There were signs of an ordinary high water mark and drainage patterns along the bank of the Green River and Tusher Wash (see Attachment A). NWI data shows the presence of open waters (in the river channel) and wetlands along the banks of the Green River (Figure 3). According to NWI mapping, there are wetlands present along the river margin within the Study Area (NWI 2013). Table 2 lists these wetland types and their classifications.

Table 2. NWI Wetland Types with Cowardin Classifications

Classification Abbreviation	System	Subsystem	Class	Water Regime	Total Acres
R3USC	Riverine	Upper Perennial	Unconsolidated Shore	Seasonally Flooded	5.33
R3USA	Riverine	Upper Perennial	Unconsolidated Shore	Temporary Flooded	0.9
PSSA	Palustrine	--	Scrub Shrub	Temporarily Flooded	21.96

3.1.4 USGS Maps

The USGS map identified the general topography and important site features within and in the vicinity of the Study Area. The Diversion, Green River, Tusher Wash, roads and surrounding topography were illustrated on this map.

3.2 Preliminary Field Investigation

McMillen identified wetlands of the riverine, or riparian, type (Brinson 1993): the Green River and its' associated vegetation within the river corridor; Tusher Wash; and, the East Side Canal to be potential jurisdictional waters of the US and wetlands. For purposes of estimation, Figure 3 depicts those wetlands and waters found within the Study Area, which includes potential construction impact zones, staging and access areas.

3.2.1 Soils

One soil sample was taken during the winter survey. The soils in the sample plot (see Attachment A) consisted of sandy low chroma soils that exhibited redox depletions and concentrations within 12 inches of the ground surface. However, it is assumed that low chroma soils may be present throughout the Study Area in both upland and wetland areas,

due to its location within the river corridor and floodplain. Further investigation will be performed during the delineation during the growing season.

3.2.2 Vegetation

The following vegetation listed in Table 3 were observed along the banks of the river during the February 6, 2014 field visit.

Table 3. Vegetation Observed and Wetland Indicator Status

Scientific Name	Common Name	Wetland Indicator Status
Emergents:		
Carex spp.	Sedge	OBL, FACW
Juncus spp.	Rush	OBL, FACW
Phragmites spp.	Common reed	FACW
Scirpus acutus	Hardstem bulrush	OBL, FACW
Typha spp.	Cattail	OBL
Woody Shrubs and Trees:		
Cornus stolonifera	Redosier dogwood	FACW
Elaeagnus angustifolia	Russian olive	FAC
Populus spp.	Cottonwood	FAC, FACW
Salix spp.	Willow species	FACW (possible)
Tamarisk spp.	Salt cedar	FAC
Other, Upland:		
Kochia scoparia	Annual kochia	UPL

3.2.3 Hydrology

The Green River was flowing at the time of the site visit but the top layer of the river was frozen above the Diversion. Tusher Wash was not flowing at the time of the site visit. Observed wetland areas were frozen on the ground impeding the creation of a soil pit. However, the frozen top layer indicated the presence of hydrology within 12 inches of the ground surface.

3.2.4 Observed Waters of the US and Wetlands

The waters of the US inventory indicates that potential jurisdictional waters of the US in the Study Area can be divided into natural rivers and washes, irrigation-related canals, laterals, and drains, and wetlands.

Green River

The Green River is the chief tributary of the Colorado River. The watershed of the river, known as the Green River Basin, covers parts of Wyoming, Utah, and Colorado. The Green River is 730 miles long, beginning in the Wind River Mountains of Wyoming and flowing through Wyoming and Utah for most of its course, except for 40 miles into western Colorado. The average yearly mean flow of the river at Green River, Utah is 6,121 cubic feet per second. The river spans 750-feet from bank to bank at the diversion. The banks are disturbed in several locations, dominated by Russian olive and tamarisk. The river is classified as Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded (R3UBH).

Tusher Wash

The Tusher Wash is a 20-foot wide ephemeral wash that flows out of Tusher Canyon during extreme storm events. The wash in the Study Area is dry and is typically used as an access road. During the February field visit, the wash was dry and a large amount of sediment had been deposited at the delta into the Green River (see Attachment A). The wash is classified as Riverine, Intermittent, Unconsolidated Bottom, Temporarily Flooded (R4UBA).

Irrigation Canals

Three man-made irrigation canals are associated with the diversion: the East Side Canal, the Green River Canal, and the Thayn Raceway. The East Side Canal and Thayn Raceway are within the project footprint. The canals is classified as Riverine, Intermittent, Unconsolidated Bottom, Artificially Flooded (R4UBK).

Wetlands

The NWI map lists numerous wetlands within the Study Area. However, the site visit revealed the presence of only two wetland features within the Study Area. These two wetlands are classified as Palustrine, Emergent, Seasonally Flooded (PEMC) and total 0.34 acres in size. Areas have been approximated and will be verified during the site delineation in spring 2014.

4.0 CONCLUSIONS AND RECOMMENDATIONS

This preliminary waters of the US inventory was performed in February 2014 by McMillen within the Survey Area for the Green River Diversion Rehabilitation project in Emery and Grand Counties, Utah. The inventory was performed to help NRCS identify potential design and construction constraints related to critical aquatic features that occur within the Study Area. The boundaries of the identified aquatic features are depicted in the attached figures.

The Study Area includes wetlands associated with the Green River and with signs of vegetation, soils and hydrology. The Study Area waters are assumed to be classified as jurisdictional waters of the United States, and as such a comprehensive waters of the US and wetland delineation will be performed in spring 2014 during the growing season.

REFERENCES

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Brinson, M. M. 1993. "A Hydrogeomorphic Classification for Wetlands", Technical Report WRPDE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

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FIGURES

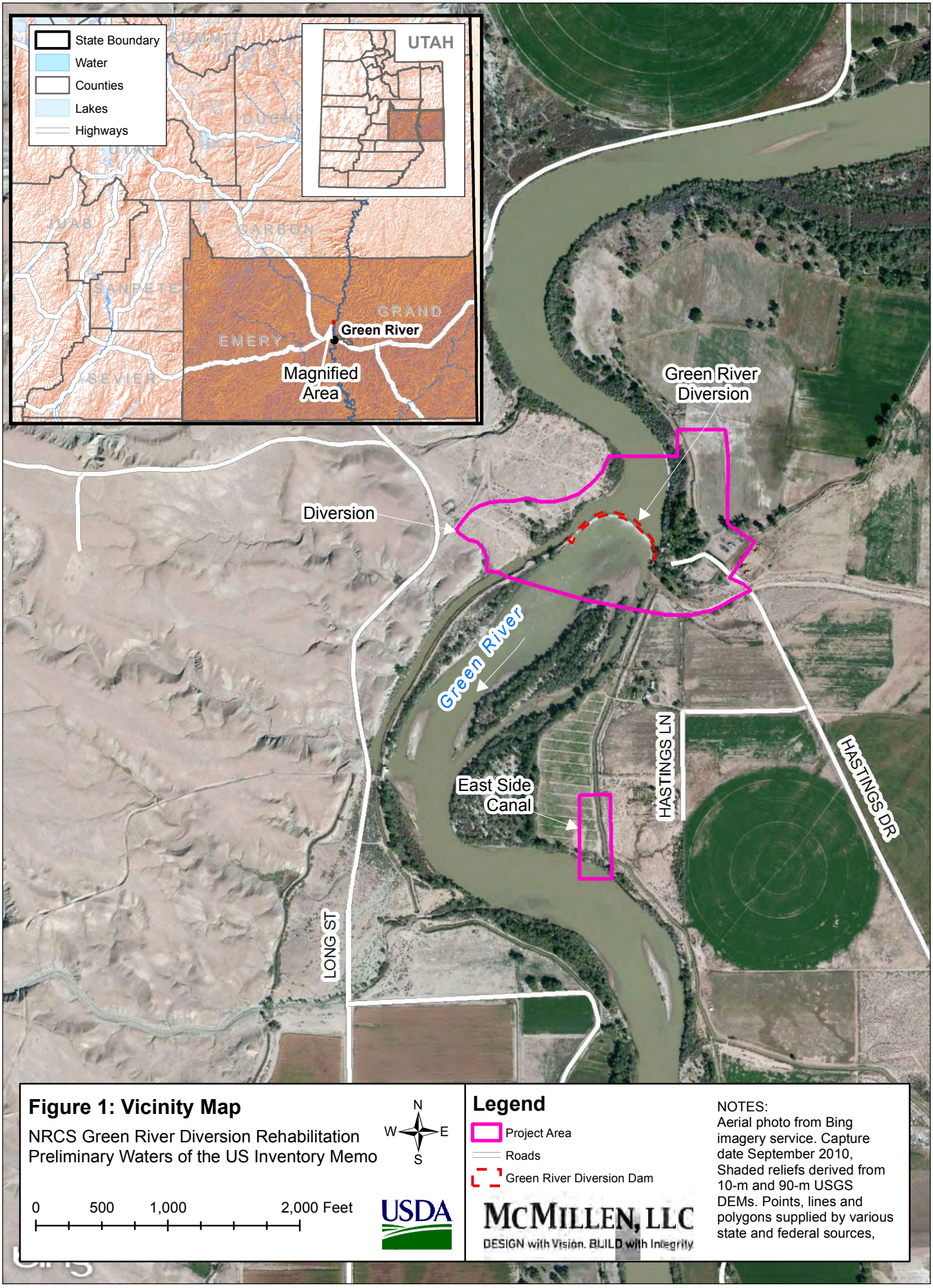


Figure 1: Vicinity Map

NRCS Green River Diversion Rehabilitation
Preliminary Waters of the US Inventory Memo

N
W E
S

0 500 1,000 2,000 Feet

USDA

Legend

- Project Area
- Roads
- Green River Diversion Dam

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010, Shaded reliefs derived from 10-m and 90-m USGS DEMs. Points, lines and polygons supplied by various state and federal sources,

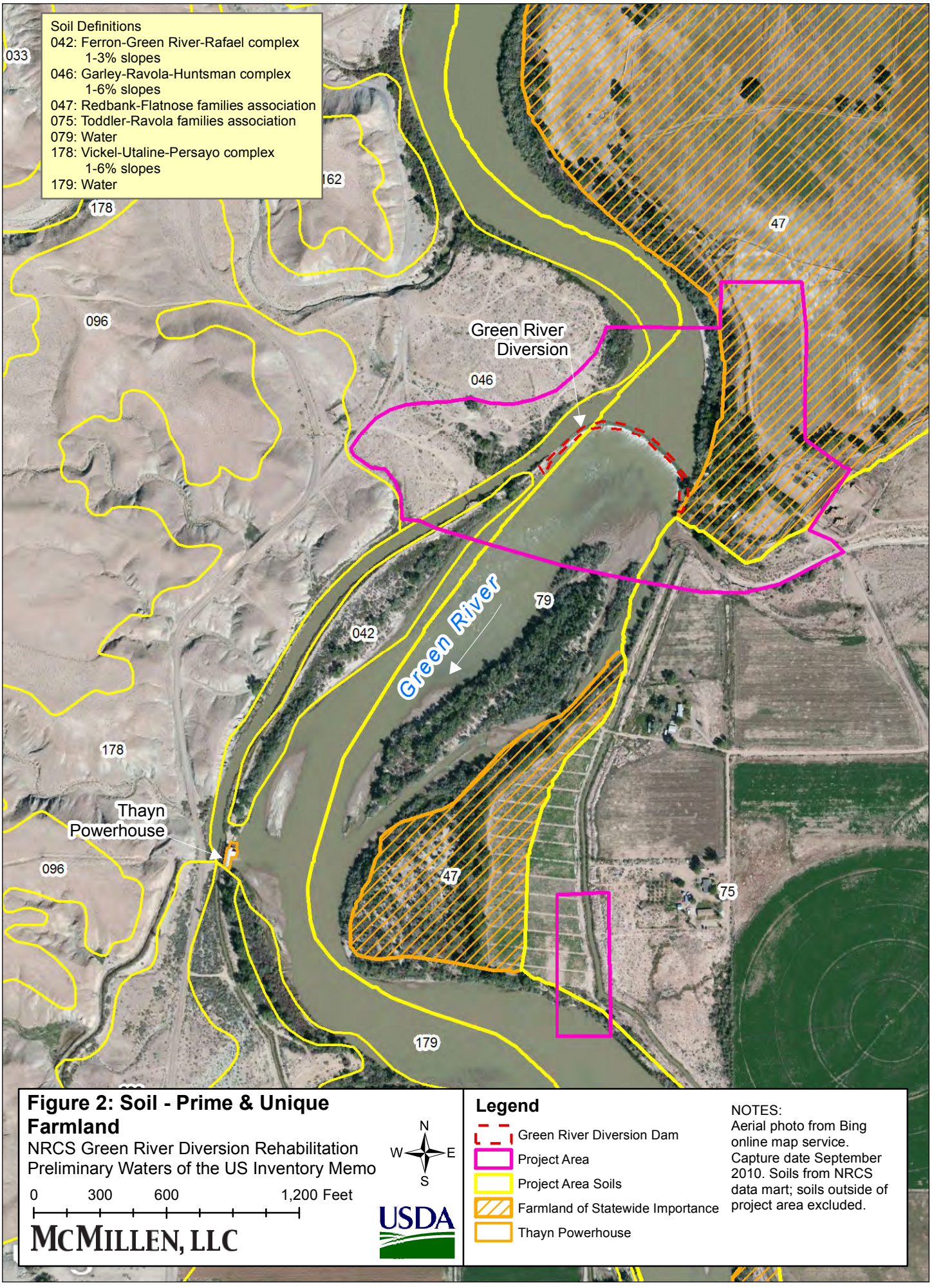


Figure 2: Soil - Prime & Unique Farmland

NRCS Green River Diversion Rehabilitation
Preliminary Waters of the US Inventory Memo

0 300 600 1,200 Feet

N W E S

McMILLEN, LLC

USDA

Legend

- Green River Diversion Dam
- Project Area
- Project Area Soils
- Farmland of Statewide Importance
- Thayn Powerhouse

NOTES:
Aerial photo from Bing online map service. Capture date September 2010. Soils from NRCS data mart; soils outside of project area excluded.

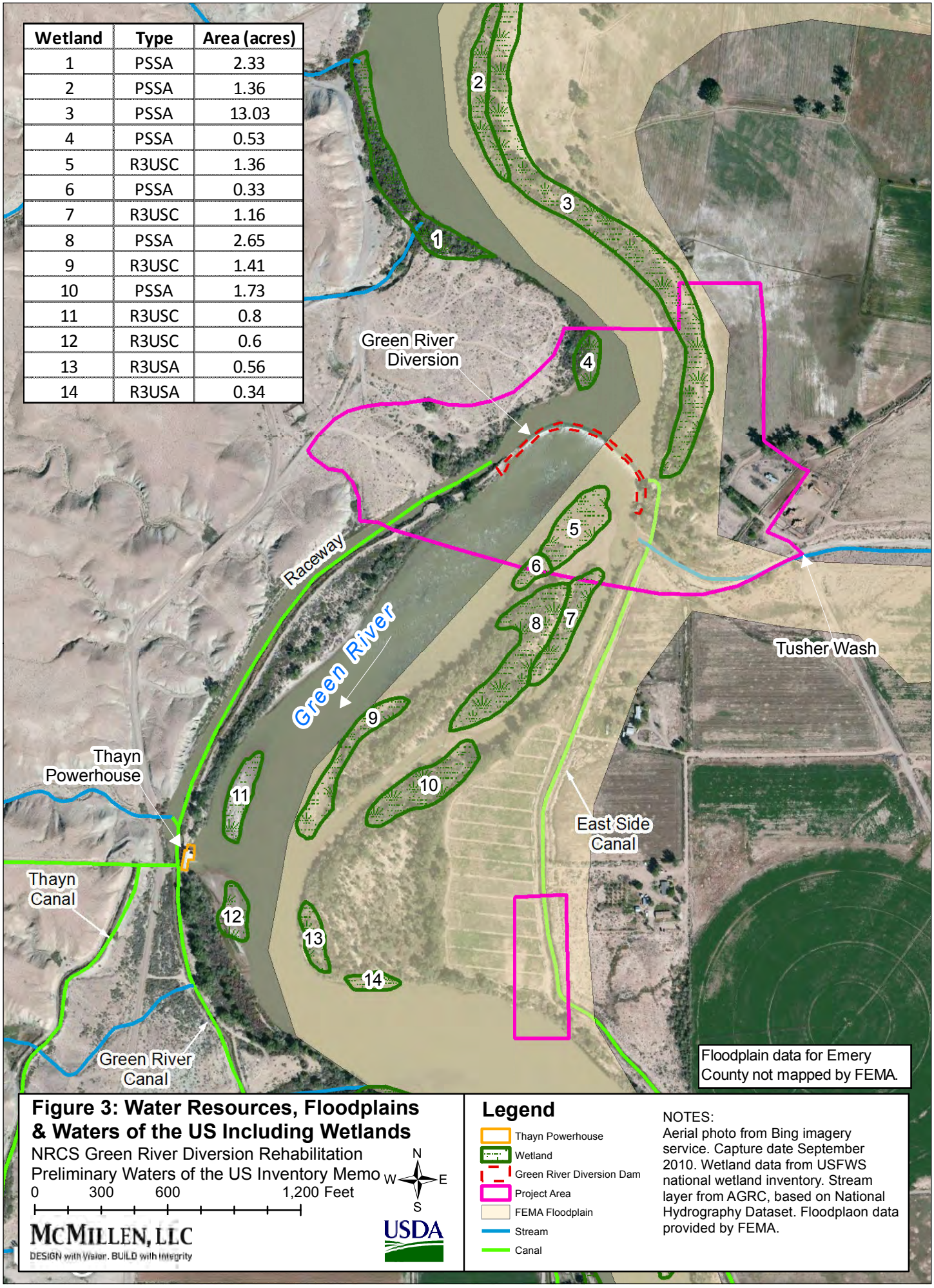


Figure 3: Water Resources, Floodplains & Waters of the US Including Wetlands

NRCS Green River Diversion Rehabilitation

Preliminary Waters of the US Inventory Memo

0 300 600 1,200 Feet

N W E S

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity

USDA

Legend

- Thayn Powerhouse
- Wetland
- Green River Diversion Dam
- Project Area
- FEMA Floodplain
- Stream
- Canal

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Wetland data from USFWS national wetland inventory. Stream layer from AGRC, based on National Hydrography Dataset. Floodplaon data provided by FEMA.

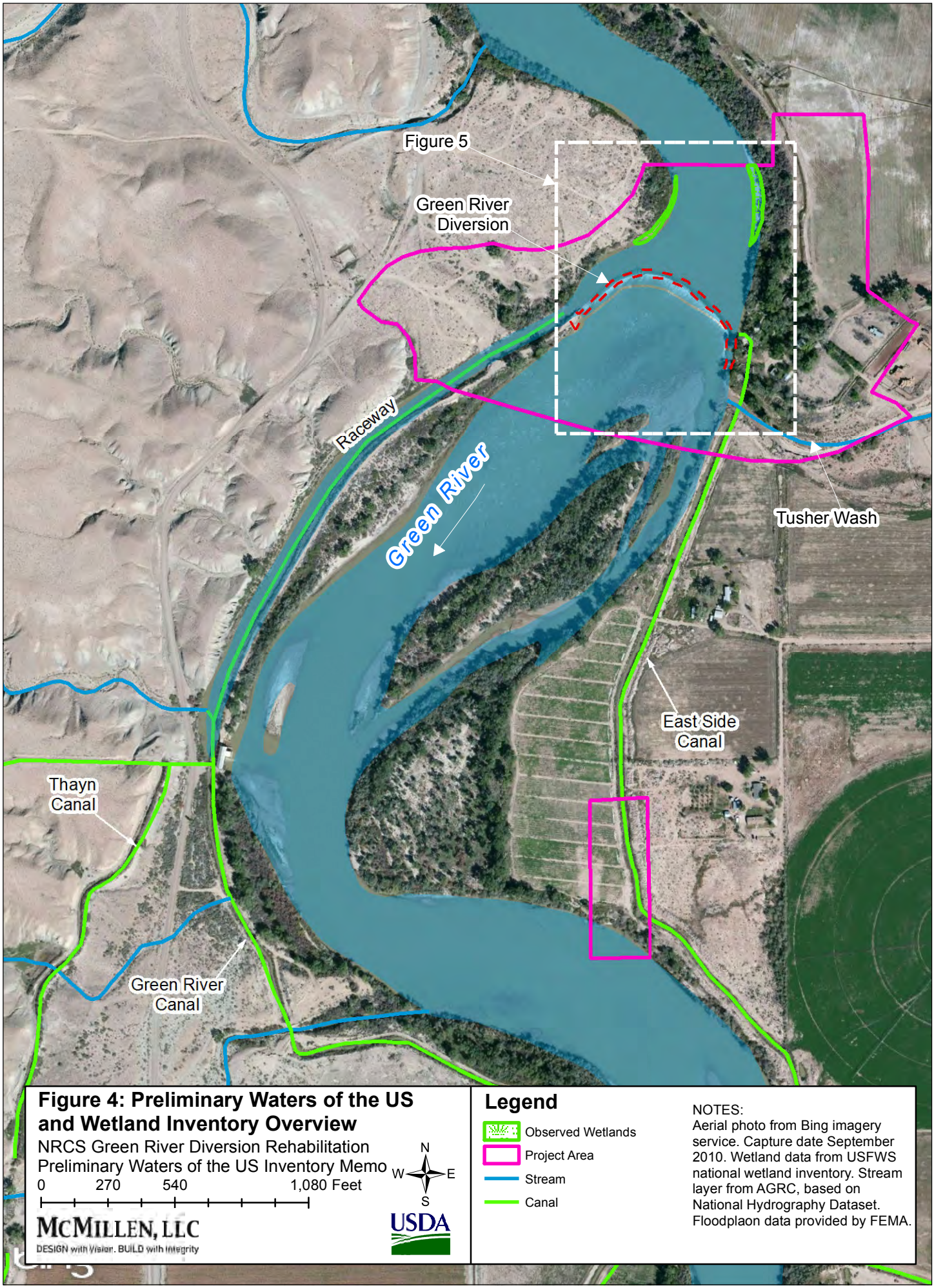


Figure 4: Preliminary Waters of the US and Wetland Inventory Overview

NRCS Green River Diversion Rehabilitation
Preliminary Waters of the US Inventory Memo

0 270 540 1,080 Feet

N W E S

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity

USDA

Legend

- Observed Wetlands
- Project Area
- Stream
- Canal

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Wetland data from USFWS national wetland inventory. Stream layer from AGRC, based on National Hydrography Dataset. Floodplaon data provided by FEMA.

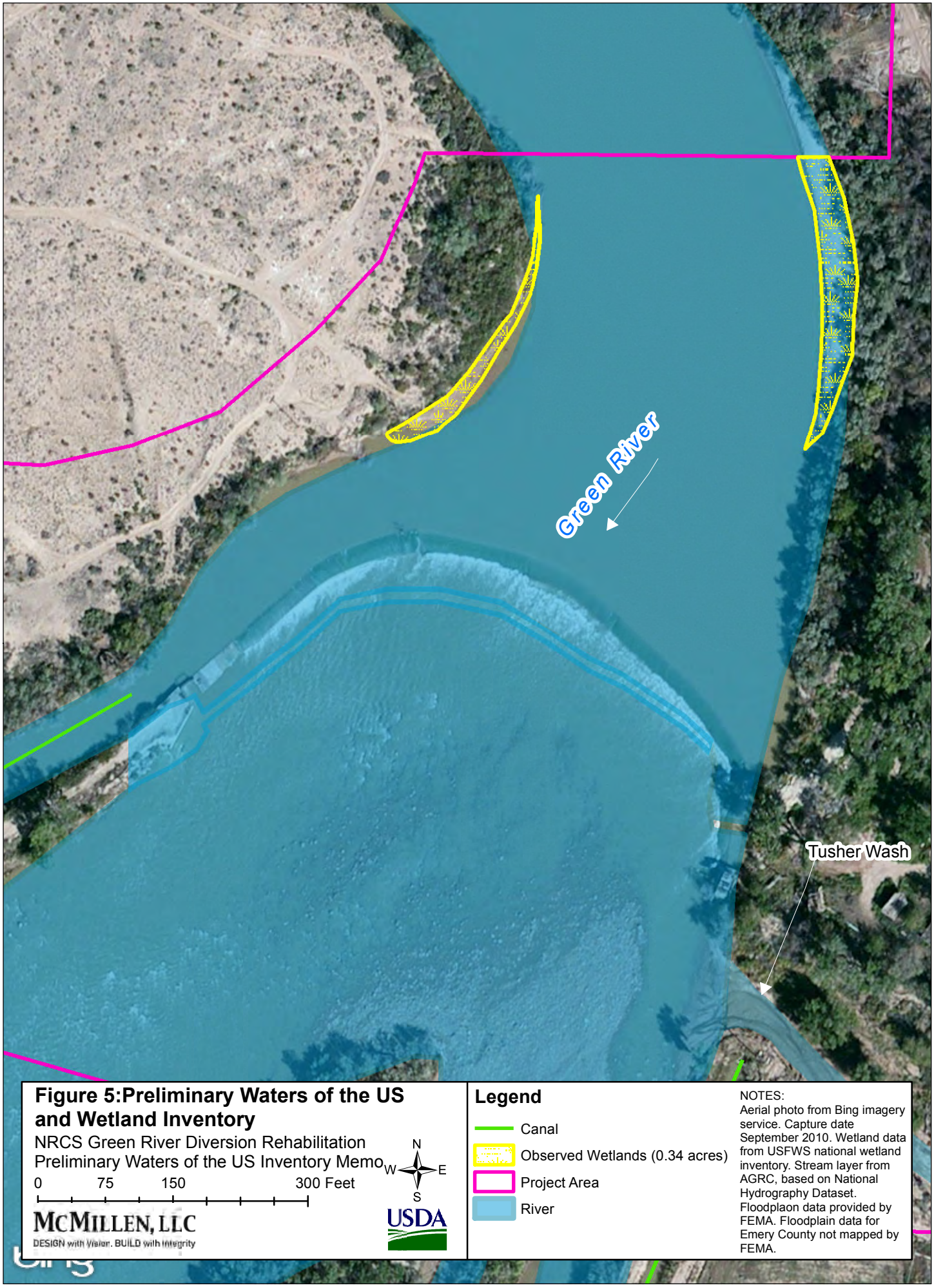


Figure 5:Preliminary Waters of the US and Wetland Inventory

NRCS Green River Diversion Rehabilitation
Preliminary Waters of the US Inventory Memo

0 75 150 300 Feet

N
W E
S

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity

USDA

Legend

- Canal
- Observed Wetlands (0.34 acres)
- Project Area
- River

NOTES:
Aerial photo from Bing imagery service. Capture date September 2010. Wetland data from USFWS national wetland inventory. Stream layer from AGRC, based on National Hydrography Dataset. Floodplaon data provided by FEMA. Floodplain data for Emery County not mapped by FEMA.

ATTACHMENT A

SITE PHOTOGRAPHS

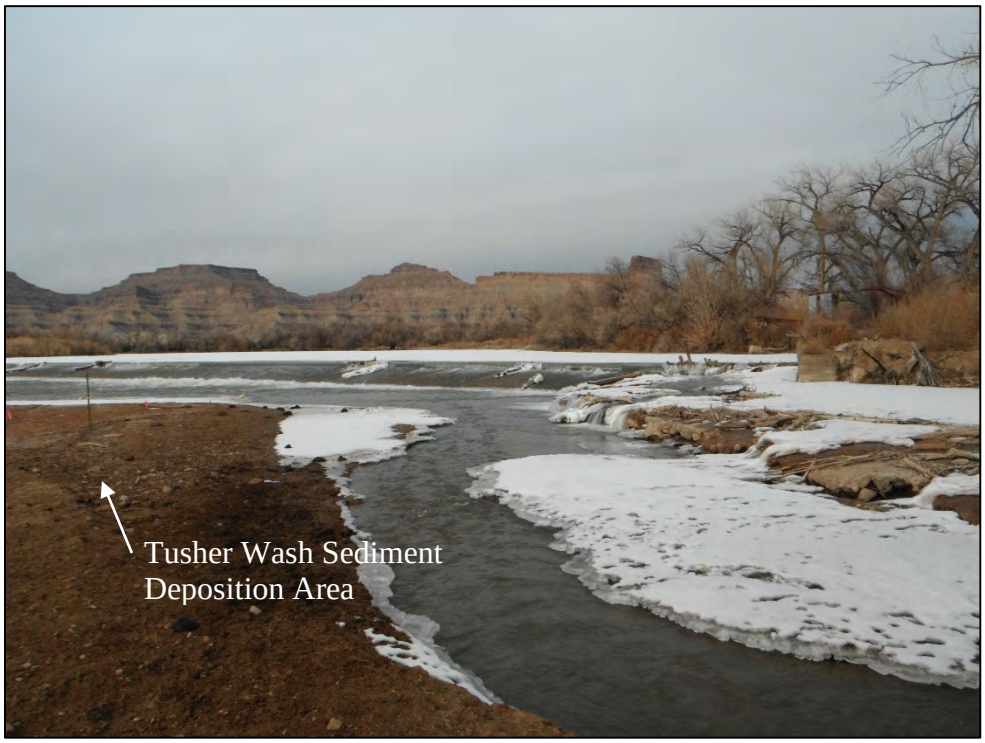


Photo 1. View looking upstream toward the diversion (north) from Tusher Wash

Photo 2. View looking upstream of the diversion (north) along east bank beach area

Photo 3. Sample Plot 1, located upstream of the diversion within east bank beach area

Photo 4. Sample Plot 1 Soil (exhibits signs of saturation)

APPENDIX D – PROJECT COORDINATION

EA to EIS Meeting Minutes 3-4-2013

USFWS 2nd Scoping Period Comment Letter 7-1-2013

Cultural Resources – Concurrence

SHPO Concurrence 10-16-2013

FF&SL Concurrence 10-21-13

Cultural Resource Survey Consultation Request Letters

Utah FFSL Letter 1-31-2014

Cultural Meeting Minutes 2-6-2014

Recreation Meeting Minutes 2-13-2014

Project Meeting Minutes 2-18-2014

Project Meeting Minutes 3-3-2014

DRAFT MEETING MINUTES

McMILLEN, LLC

To:	Meeting Attendees	Project:	NRCS Green River Diversion Rehabilitation
From:	Dan Axness	cc:	File
Meeting Date:	March 4, 2013	Job No:	AG-3A75-C-10-0025
Subject:	Draft Green River EA vs EIS Meeting Minutes.		

1.0 INTRODUCTION

This memorandum documents the meeting held on March 4, 2013 via phone conference with attendees in Salt Lake City, Utah (NRCS) and in Boise, Idaho (McMillen). The meeting began at 11:00 am and the following people were in attendance:

Attendee	Project Role	Organization
Bronson Smart	State Conservation Engineer	NRCS, Utah
Norm Evenstad	Water Resources Coordinator	NRCS, Utah
Andrew Williamson	State Archaeologist	NRCS, Utah
Casey Burns	State Biologist	NRCS, Utah
Anthony Beals	EWP Specialist	NRCS, Utah
Derek Hamilton	EWP Biologist	NRCS, Utah
Dan Axness	Project Manager	McMillen, LLC
Greg Allington	NEPA Manager	McMillen, LLC

2.0 DISCUSSION

EA vs EIS

During the site meeting on February 22, 2013 with the Utah State Historic Preservation Office, it was determined that any modification to the diversion dam would be an adverse effect to cultural resources. The level of intensity of those impacts would be dependent on the proposed alternative for the project. Currently, the proposed alternative is to demolish the existing structure and install a new structure downstream to stabilize the structure stability and improve fish passage.

Impacts to the structure would most likely be considered “significant” which would require the preparation of an Environmental Impact Statement (EIS) to comply with the National

Environmental Policy Act (NEPA). Currently, the project is being analyzed under an Environment al Assessment (EA).

Andrew Williamson stated that the project team may spend as much time, effort and money justifying why this is not an EIS as it would take to prepare an EIS.

Bronson Smart and Dan Axness pointed out that changes required for stability, construction access and fish passage will require significant changes to the structure including:

- Cutting the diversion dam to construct fish passage notches to concentrate low flows moving over the structure;
- The existing structure will require the addition of a concrete cap as a "wearing surface"; and
- Preventing seepage under and through the will require the addition of steel pile and significant concrete fill.

It was determined by the meeting attendees that the project will proceed with the preparation of an EIS. McMillen stated they will develop a cost estimate and revised schedule for a Contract Amendment to develop the EIS and other studies that will be required for supplementation.

Cultural Mitigation

Dan Axness suggested that NRCS should use McMillen's subcontractor (Native-X) architectural historian to help document historic structures for the project. The group discussed the potential roles for Native X which would include documenting the current structure and preparing mitigation plans to address adverse effects caused by repair or replacement of the existing structure.

The group noted during the meeting that any alternative would require some sort of cultural mitigation.

3.0 CLOSING

The meeting adjourned at 11:30 am.

4.0 ACTION ITEMS

- McMillen prepare cost estimate and revised schedule for a Contract Modification top prepare an EIS.
- McMillen talk to Native-X regarding their possible role in the project.

Comment 39

United States Department of the Interior
FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
2369 WEST ORTON CIRCLE, SUITE 50
WEST VALLEY CITY, UTAH 84119

July 1, 2013

In Reply Refer To:
FWS/R6
ES/UT
09-I-0217

Mr. Bronson Smart, State Engineer
Natural Resource Conservation Service
125 S. State Street – Room 4010
Salt Lake City, UT 84138-1100

RE: Green River Diversion Rehabilitation, Grand & Emery Counties, Utah; EIS Scoping Comments

Dear Mr. Smart:

On June 3, 2013, we received your Notice for a 2nd Scoping Period for the rehabilitation of the Green River Diversion (Diversion), which spans the Green River upstream of the town of Green River, Utah. We appreciate the coordination between our offices and your support of endangered species considerations during the preliminary discussions concerning this project. As we further describe below, it is important that the rehabilitation of the Green River Diversion consider impacts to federally listed fish species. In response to your scoping notice, we submit the following comments pursuant to our authorities under the National Environmental Policy Act and the Endangered Species Act (ESA) of 1973.

Importance of the Green River to endangered fish recovery

Four federally endangered species inhabit the Green River: bonytail (*Gila elegans*); Colorado pikeminnow (*Ptychocheilus lucius*); humpback chub (*Gila cypha*); and razorback sucker (*Xyrauchen texanus*). Portions of the Green River are designated as critical habitat to all four species; the entire length of the Green River and its 100 year floodplain is designated as critical habitat for at least one species between the Yampa River confluence and the Colorado River confluence (Appendix A)[1]. Furthermore, the Diversion is located within critical habitat for the Colorado pikeminnow and razorback sucker, and directly downstream of Desolation Canyon, which is designated critical habitat for the bonytail and humpback chub.

The Green River Basin, particularly the mainstem Green River, is vital to the recovery of these four species. Maintaining self-sustaining populations in the Green River is a recovery goal for all four

[1] For a detailed description of the critical habitat reaches, please see the Federal Register: 59 FR 13374

species (U.S. Fish and Wildlife Service 2002a, 2002b, 2002c, 2002d). Currently, the Green River Basin harbors:

- the largest, most productive, and most robust population of the Colorado pikeminnow;
- two known, active spawning locations of the Colorado pikeminnow;
- two known population centers of humpback chub;
- two known, active spawning locations of the razorback sucker; and
- populations of stocked individuals of razorback sucker and bonytail;

These four species are adapted to desert river hydrology (characterized by large spring peaks of snow-melt runoff and low, relatively stable base flows) and long, unimpeded stretches of river. Unimpeded stretches of river are crucial to the life histories of these species in order to support migrations of spawning individuals, drifting of newly produced young-of-year fish, and home-range expansion of juveniles. Specifically, razorback sucker and Colorado pikeminnow annually migrate to established spawning areas to reproduce (U.S. Fish and Wildlife Service 2002b, 2002d). Individuals travel long distances to reach these sites (745 river kilometers round-trip on record for Colorado pikeminnow) (U.S. Fish and Wildlife Service 2002b). Colorado pikeminnow spawn in two principal sites: Gray Canyon in the lower Green River; and the lower Yampa River (U.S. Fish and Wildlife Service 2002b). Known spawning sites for razorback sucker are located in the lower Yampa River and in the Green River near Escalante Ranch, but other, less-used sites are probable (U.S. Fish and Wildlife Service 2002d). Because all of the spawning sites are upstream of the Diversion, any individual fish that occurs downstream of the Diversion (or in the Colorado River) must pass over the Diversion to reach these spawning sites (and conversely must pass over it in the downstream direction to return to their home range).

After viable eggs are produced at spawning areas, eggs hatch into larval fish. Larval fish remain in the river substrate for about a week and then emerge into the water column. Larval fish are very small (<0.5 inches total length) and incapable of directed swimming from the time of hatching through the first 2-4 weeks of their life. As a result, they drift downstream with the current, ending up in slow water habitats where they can grow and achieve swimming ability. Because the Diversion is downstream of spawning locations, many larval fish pass over the Diversion each year. This input of larval fish makes the lower Green River an important nursery area for young fish.

As young fish in the lower Green River grow and reach sexually maturity, they require an ability to migrate to spawning locations and other new habitats. In fact, juvenile fish in the lower Green River commonly leave this area and establish new home areas upstream. Increased recruitment[2] that resulted in increased abundance of adult Colorado pikeminnow in the Green River Basin in 2006 to 2008 likely originated from a large year class of age-0 Colorado pikeminnow produced in the lower Green River during 2000 (Bestgen *et al.* 2010). Furthermore, population studies indicate that many small Colorado pikeminnow leave the lower Green River and immigrate into upstream areas such as Desolation Canyon and the White River (Bestgen *et al.* 2010). Overall transition rates reflect a general movement pattern of Colorado pikeminnow from Desolation-Gray Canyon and the lower Green River into upstream reaches; this trend demonstrates that young fish reared in the lower Green River support populations of adult fish throughout the Green River basin (Bestgen *et al.* 2010).

[2] Recruitment is defined as an organism transitioning from an immature individual to a sexually mature individual; thus becoming a reproductively active member of the population

As you can see, maintaining connectivity between population centers and spawning sites is vital to reaching the de-listing goals of self-sufficient populations of these endangered fish species for a variety of biological reasons.

Considerations for the Green River Diversion rehabilitation

In the course of designing any future modifications to the Green River Diversion, it is important to consider how the modifications may impact the endangered fish species and how the impacts may be avoided, minimized, or mitigated. We foresee the following considerations as being important for any design modification:

1. *Fish Passage* – Providing safe, effective fish passage for both up- and downstream movements year-round in most years;
2. *Reducing Construction Impacts* – Avoiding impacts whenever feasible by following proper construction BMPs, work timing, material selection, and de-watering protocols;
3. *Maintaining Habitat* – Maintaining suitable habitat in the project vicinity, by providing adequate hydrological, thermal, and chemical conditions; and
4. *Electrical Barrier Component* – Assisting the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) in the effective design, construction, and operation of an electric barrier to prevent fish entrainment into the Green River Canal and Thayn Hydroelectric facility.

Fish Passage

As described in detail above, it is critical to species recovery that the Green River Diversion does not act as a barrier to fish movement. If individuals are prevented from migrating up- and downstream, the populations of the four species will be heavily impacted. We have spoken with your office about designing an appropriate suite of fish passage options, including an upstream passage on river left (near the water wheel), downstream fish passage 'notches', and a fish return system from the 'raceway'[3] section.

Designing fish passage for native, warm-water fishes requires special design criteria because these species are not equipped with strong burst speeds or jumping abilities. Therefore, fish-ladders (or other structures designed for salmonids) will not work for these species. Fish passage design must take into account native fish swimming ability, which is related to body size. At this time we believe any upstream fish passage must be able to move individuals that are 200 millimeters and longer. This size requirement should allow the smallest juvenile fish (and therefore the weakest swimmer) that might leave the lower Green River to access upstream habitats.

In addition, designs must analyze flows available inter- and intra-annually, to ensure that flows will be available year round to operate the facility. In other words, the fish passage options must work year round, under a variety of flow regimes, in the vast majority of years. Most importantly the fish passage must work in the majority of dry years, when little flow is available at the Diversion. However, our office understands that the fish passage should not infringe upon any existing water right in the local area, so passage operation will need to be closely monitored.

[3] The large channel that takes water to both the Green River Canal and Thayn Hydroelectric facility

We have recently seen comments requesting downstream boat passage at the structure. We have no opposition in principle to boat passage – in fact scientific research crews would likely benefit from the use of such a boat passage. However, we strongly emphasize that any boat passage design must be able to maintain the important fish passage components. That is, the design of a boat passage must ensure that proper water velocities and quantities are maintained at the fish passage, and funds are still available to construct the fish passage. Any reduced function of a fish passage structure would be considered in an inter-agency consultation under the Endangered Species Act.

We believe that designing an effective set of fish passage options is quite feasible. We are encouraged by initial discussions with your office that demonstrate the potential for such structures. We would like to continue coordinating and working with your office's engineers to help design a long-lasting Diversion that will support water use and benefit native fish species.

Construction Impacts

Once a preferred alternative is chosen for the Diversion rehabilitation, it will be important for our offices to work closely on appropriate construction methods to reduce impacts to the river and to individual fish. When working in designated critical habitat it is important to choose the least impactful techniques for accomplishing effective construction. Usually the least impactful timing for construction is in the fall, as the reproductive season has ended and flows are safer for construction crews.

The de-watering component of the project is a key decision that will affect construction and fish. We support using the existing structure as a possible de-watering feature, as it may reduce the impact of installing new de-watering structures. Whatever de-watering option is chosen, we ask that it not act as a fish passage barrier, that it be cleared of fish trapped inside before work begins, and that it not contribute large sediments loads to the downstream areas.

Maintaining Habitat

It is important that suitable habitat for endangered fish species is maintained in the vicinity of the Diversion after the project is complete. In fact, because this stretch of river is designated critical habitat for the razorback sucker and Colorado pikeminnow, a project cannot adversely modify the habitat. We have specific habitat criteria, called primary constituent elements (PCEs) for the designated critical habitat in the Green River.

Water, physical habitat, and the biological environment are the PCEs of critical habitat for these fish species. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation, and competition are important elements of the biological environment.

Habitat in the vicinity of the project would need to remain suitable for endangered fish. For this project, habitat condition is largely controlled by flows in the river channel. Habitat conditions regulated by flows that must be considered include, but are not limited to:

- Adequate water depth for fish movement, both over the diversion through a passage facility and local movement across the river channel; and
- Suitable chemical conditions, such as temperature, dissolved oxygen, and pollution levels.

Proper water management at the Diversion will ensure that the project does not dry dam the Green River. Dry damming the river will result in significant entrainment issues and effectively remove habitat from that portion of the river. Analyses must be conducted to clearly identify the flows necessary to provide adequate habitat for the endangered fish downstream of the Diversion.

Electrical Barrier Component

It is the responsibility of the Recovery Program to enact a project that reduces the existing entrainment of fish into the Green River Canal and Thayn Hydroelectric facility. After careful deliberation, the Recovery Program has chosen to fund the construction and operation of an electric barrier that inhibits fish entrainment into these facilities by creating an electric field which irritates fish and compels them to leave the area. The Recovery Program believes that this electric barrier is a superior option to an alternative of installing a physical rolling drum screen structure because it will offer more effective entrainment prevention and will not negatively affect water use in the area.

Because the two projects (the Diversion rehabilitation and the electric barrier) will each benefit if designed, constructed, and operated as one, your office and the Recovery Program have been in consistent discussions about the electrical barrier component. We applaud your early coordination that will ensure that both projects are congruous.

To enact the project, the Recovery Program will fund the design, construction, and operation of the electrical barrier components. To assist in this process your office has agreed to consider these design, construction, and operation components in your project planning. To ensure successful implementation of both projects, please continue this coordinated effort. The effective operation of the electric barrier is a key component of species recovery, and your assistance in the project is greatly valued.

Conclusion

We appreciate your office's continued coordination with us concerning this project. Through the entire process, your office has been very supportive of ideas to promote native species. Thank you for the opportunity to comment on this project. We look forward to working with you in the future. If you have any questions or need further information please contact Kevin McAbee at (801) 975-3330 extension 143.

Sincerely,

Larry Crist
Utah Field Supervisor

cc: Upper Colorado River Endangered Fish Recovery Program; Attn: Tom Chart

Region 6 RO; Attn: Dave Carlson

Lisa Chetnik Treichel
DOI Office of Environmental Policy and Compliance
1849 C Street, NW --MS 2462-MIB
Washington, DC 20240

Stephanie M. Nash, Environmental Protection Specialist
Division of Habitat and Resource Conservation
Branch of Conservation Planning Assistance
4401 North Fairfax Drive, ARLSQ-840J
Arlington, VA 22203

Literature Cited

Bestgen, K. R., J. A. Hawkins, G. C. White, C.D. Walford, P. Badame & L. Monroe. 2010. Population Status of Colorado pikeminnow in the Green River Basin, Utah and Colorado, 2006-2008. Colorado River Recovery Implementation Program Project Number 128. 112 pages.

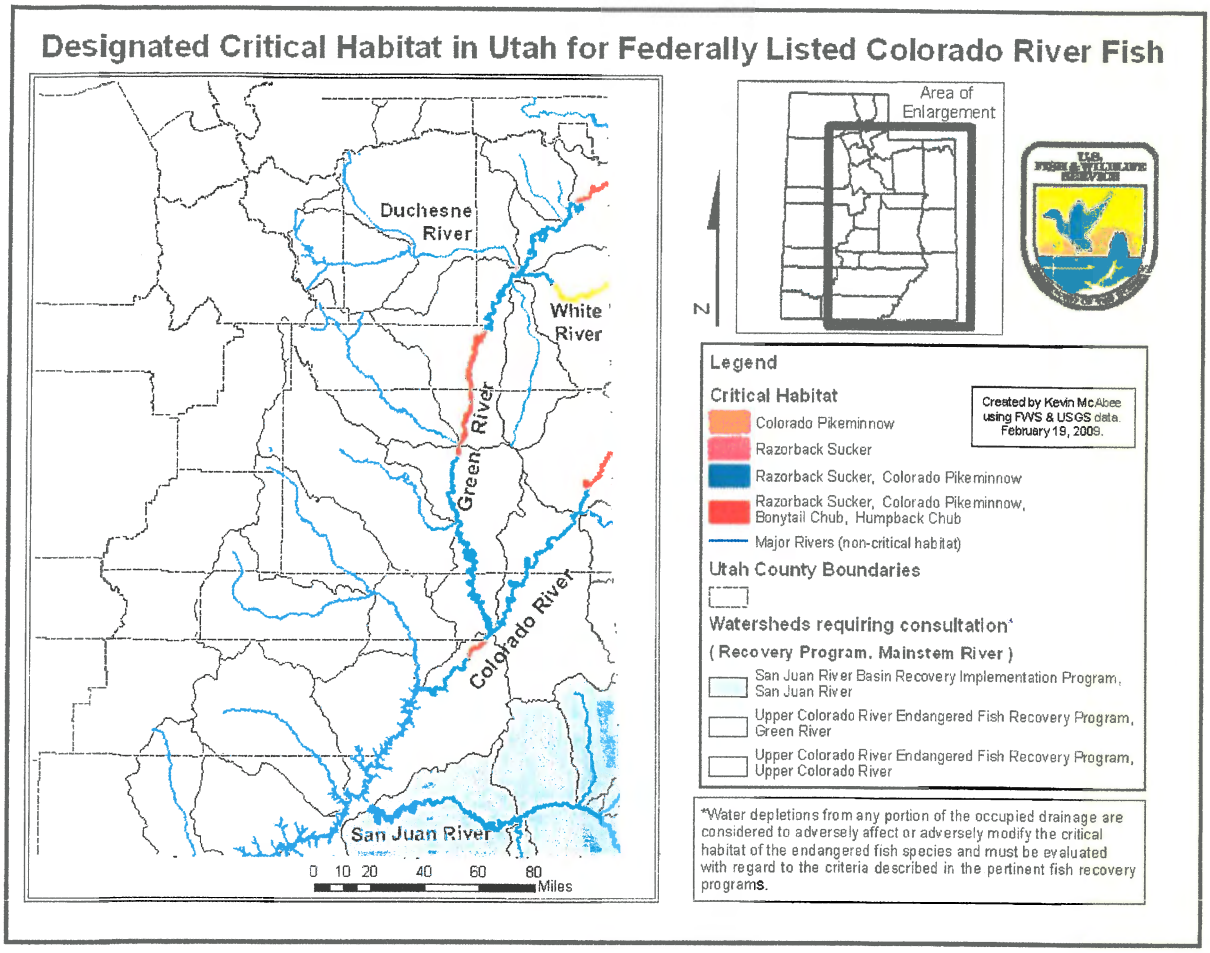
U.S. Fish and Wildlife Service. 2002a. Bonytail (*Gila elegans*) Recovery Goals: amendment and supplement to the Bonytail Chub Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 97 pages.

U.S. Fish and Wildlife Service. 2002b. Colorado pikeminnow (*Ptychocheilus lucius*) Recovery Goals: amendment and supplement to the Colorado Squawfish Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 111 pages.

U.S. Fish and Wildlife Service. 2002c. Humpback chub (*Gila cypha*) Recovery Goals: amendment and supplement to the Humpback Chub Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 107 pages.

U.S. Fish and Wildlife Service. 2002d. Razorback Sucker (*Xyrauchen texanus*) Recovery Goals: amendment and supplement to the Razorback Sucker Recovery Plan. Denver, Colorado: US Fish and Wildlife Service, Mountain-Prairie Region. 113 pages.

Appendix A


Designated Critical Habitat in Utah for Federally Listed Colorado River Fish
Duchesne River
White River
Green River
Colorado River
San Juan River
0 10 20 40 60 80
Miles
Area of Enlargement
N
Legend
Critical Habitat
Colorado Pikeminnow
Razorback Sucker
Razorback Sucker, Colorado Pikeminnow
Razorback Sucker, Colorado Pikeminnow, Bonytail Chub, Humpback Chub
Major Rivers (non-critical habitat)
Utah County Boundaries
Watersheds requiring consultation*
(Recovery Program, Mainstem River)
San Juan River Basin Recovery Implementation Program, San Juan River
Upper Colorado River Endangered Fish Recovery Program, Green River
Upper Colorado River Endangered Fish Recovery Program, Upper Colorado River
Created by Kevin McAbee using FWS & USGS data. February 19, 2009.
*Water depletions from any portion of the occupied drainage are considered to adversely affect or adversely modify the critical habitat of the endangered fish species and must be evaluated with regard to the criteria described in the pertinent fish recovery programs.

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Julie Fisher
Executive Director
Department of
Heritage & Arts

Utah Division of
State History

Brad Westwood
Director

October 16, 2013

David C. Brown
State Conservationist
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, Utah 84138-1100

RE: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah U-13-SH-0354

For future correspondence, please reference Case No. 13-1253

Dear Mr. Brown:

The Utah State Historic Preservation Office received your request for our comment on the above-referenced undertaking on October 11, 2013.

We concur with your determinations of adverse effect for this undertaking. We look forward to working with you on an MOA.

This letter serves as our comment on the determinations you have made, within the consultation process specified in §36CFR800.4. If you have questions, please contact me at 801-245-7263 or Lori Hunsaker at 801-245-7241 *lhunsaker@utah.gov*.

Sincerely,

Chris Merritt, Ph.D.
Senior Preservation Specialist
cmerritt@utah.gov

Williamson, Andrew - NRCS, Salt Lake City, UT

From: Monson Shaver <monsonshaver@utah.gov>
Sent: Monday, October 21, 2013 11:56 AM
To: Williamson, Andrew - NRCS, Salt Lake City, UT; Smith, Grant - NRCS, Price, UT; Laura Ault
Subject: Cultural Resources Inventory of the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah. 13-SH-0354ps

Gary,

Thank you for the opportunity to review and comment on report 13-SH-0354bps. The Division of Wildlife Resources, in consultation with Forestry Fire and State Lands (FF&SL), concurs with the National Resources Conservation Services (NRCS) site eligibility recommendations. FF&SL also concurs that the proposed rehabilitation will adversely affect the Tusher Diversion Dam 42Em4444/42Gr4835) and the East Side Canal (42Gr4423).

FF&SL appreciates that the NRCS will continue consultation with Utah State Preservation Office (SHPO) to develop a treatment plan to mitigate or minimize adverse effect to these sites. The FF&SL looks forward to a treatment plan that will be formalized in a Memorandum of Agreement (MOA).

-
Monson Shaver
Archaeologist
Utah Division of Wildlife Resources
W 801-538-4864
Cell 801-674-8787

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Paul Abate
Fish Biologist
U.S. Fish and Wildlife Services
2369 West Orton Circle, Suite # 50
West Valley City, Utah 84119

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Abate:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. U.S. Fish and Wildlife Services is a cooperating agency and is providing funding for the protection of endangered fish and has already provided guidance regarding fish-friendly design in the proposed diversion rehabilitation. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests U.S. Fish and Wildlife Services comments regarding the project eligibility determinations and determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

BSD Acting STC

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistance State Conservationist-Field Operations, NRCS, Richfield, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

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September 30, 2013

Mr. Greg Allington
NEPA Specialist
McMillen, LLC.
1401 Shoreline Suite 100
Boise, Idaho 83702

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Allington:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, The Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests comments from McMillen, LLC regarding site eligibility determinations and the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

Acting

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistance State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Salt Lake City, Utah

United States Department of Agriculture

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Natural Resources Conservation Service
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Salt Lake City, UT 84138-1100
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FAX (801) 524-4403

September 30, 2013

Ms. Laura Ault
Sovereign Lands Program Manager
Department of Natural Resources
1594 West North Temple
Salt Lake City, Utah 84116

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Ms. Ault:

Enclosed are three IMACS site forms and a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, the Ute Tribe of Utah U.S. Fish and Wildlife Services, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests State Sovereign Lands concurrence for the eligibility determinations and for the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

BS Acting/STC

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Richfield, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

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(801) 524-4550
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September 30, 2013

Mr. Dan Axness
Design Engineer
McMillen, LLC.
1401 Shoreline Suite 100
Boise, Idaho 83702

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Axness:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests comments from McMillen, LLC, regarding site eligibility determinations and the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

B. S. Acting Ste

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

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September 30, 2013

Mr. Pat Brady
Mayor of Green River City
460 East Main Street
P.O. Box 620
Green River, Utah 84525

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Brady:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

The NRCS has determined that project installation will have a direct adverse effect on two NRHP-eligible site—the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, U.S. Fish and Wildlife Services, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).
As the lead Federal agency for this project, the NRCS invites your comments regarding project implementation as it relates to the historic properties presented in the enclosed report. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

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Natural Resources Conservation Service
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Salt Lake City, UT 84138-1100
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September 30, 2013

Ms. Jo Anne Chandler
Administrator
Green River Historic Preservation Commission,
Historical Society and Archives
1765 East Main Street
P.O. Box 620
Green River, Utah 84525-0620

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Ms. Chandler:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead federal agency for this project, the NRCS invites your comments regarding project plans and the affects implementation may have on the associated historical resources. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

Acting SC
DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

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Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
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September 30, 2013

Ms. Patricia Clabaugh
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Ms. Clabaugh:

Enclosed are four IMACS site forms and a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the U.S. Fish and Wildlife Service, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation (ACHP). The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

Two NRHP-eligible sites and two non-significant sites are located on property managed by the Bureau of Land Management (BLM) Price Field Office. The sites are located along the west bank of the Green River and include the Tusher Diversion Dam (42EM4444/42GR4835) and one multicomponent site that may be on BLM land (42EM4439). The non-significant sites include one historic and modern trash scatter (42EM4440) and two rock panels (one panel is on BLM land and one is on State Sovereign Lands) with historic inscriptions (42EM4441).

As the lead Federal agency for this project, the NRCS requests BLM concurrence for the eligibility determinations and for the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Richfield, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Ms. Irene Cuch
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah
P.O. Box 190
Fort Duchesne, Utah 84026

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Ms. Cuch:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District for the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests comments from the Ute Tribe for the eligibility determinations and for the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

BSO Acting St

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Chris Dunham
East Side Canal Company
P.O. Box 193
1200 North Hastings Road
Green River, Utah 84525

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Dunham:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

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Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS invites your comments regarding project implementation as it relates to the historic properties presented in the enclosed report. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

Acting

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

October 10, 2013

Mr. Jason A. Gipson
Chief
Nevada-Utah Regulatory Branch
U.S. Army Corps of Engineers
533 West 2600 South, Suite 150
Bountiful, Utah 84010

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Gipson:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District for the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah BLM Field Office, The Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests your comments for the eligibility determinations and for the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

BS Acting Stc

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Jeff Horrocks
Emery County Commissioner
P.O. Box 629
Castle Dale, UT 84513

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Horrocks:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District for the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead agency for this project, the NRCS requests any comments you may have regarding project effects on historic properties identified during the cultural resources survey. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

ACTING

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Ms. Lori Hunsaker
Deputy State Historic Preservation Officer - Archaeology
Utah Division of State History
300 Rio Grande Avenue
Salt Lake City, Utah 84101-1182

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Ms. Hunsaker:

Enclosed are a SHPO Cover Page, seven archaeological site forms, one archaeological site form addendum, and a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District for the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

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Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead Federal agency for this project, the NRCS requests SHPO concurrence for the eligibility determinations and for the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Brian Joseph
Archaeologist
Bureau of Reclamation
Upper Colorado Region Area Office
302 East 1860 South
Provo, Utah 84606-1000

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Joseph:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District for the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

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As the lead agency for this project, the NRCS requests your comments for the eligibility determinations and for the determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

Acting

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Dean King
President
Green River Canal Company
P.O. Box 326
1120 East Kings Lane
Green River, Utah 84525

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. King:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

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As the lead Federal agency for this project, the NRCS invites your comments regarding project implementation as it relates to the historic properties presented in the enclosed report. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Monson Shaver
Archaeologist
Utah Division of Wildlife Resources
Box 146301
Salt Lake City, Utah 84114-6301

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Shaver:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

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As the lead Federal agency for this project, the NRCS invites comments from your agency regarding the project eligibility determinations and determination of project effects. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

Acting Ste

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Richfield, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Lee Thayn
Thayn Power Plant & Thayn Ditch
P.O. Box 447
1915 North Long Street
Green River, Utah 84525

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Thayn:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

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As the lead Federal agency for this project, the NRCS invites your comments regarding project implementation as it relates to the historic properties presented in the enclosed report. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

Acting STC

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistance State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

United States Department of Agriculture

NRCS
Natural Resources Conservation Service
125 South State Street, Room 4010
Salt Lake City, UT 84138-1100
(801) 524-4550
FAX (801) 524-4403

September 30, 2013

Mr. Michael Wolfe
Chairperson
Grand County Historic Preservation Commission
220 East Market
Meeker, Colorado 81641

Reference: Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah (U-13-SH-0354bps)

Dear Mr. Wolfe:

Enclosed is a report titled "Cultural Resources Survey for the Green River Diversion Rehabilitation, Grand and Emery Counties, Utah". In brief, the Natural Resources Conservation Service (NRCS) has been providing technical and financial assistance to the Utah Department of Agriculture and Food and the Green River Conservation District with the rehabilitation of a large diversion dam located on the Green River near the town of Green River, Utah. Flooding in 2010-2011 exposed weaknesses in an existing diversion structure and raised concern over the continued safe functioning of the dam.

NRCS Area Cultural Resources Specialist Grant Carlos Smith completed an inventory of the project's area of potential effects (APE) and identified a total of eight archaeological sites, six of which are eligible for the National Register of Historical Places (NRHP). The eligible sites include the Tusher Diversion Dam (42EM4444/42GR4835), Hastings Ranch (42GR4836), the East Side Canal (42G4423), the Green River Canal (42EM4443), the Thayne Canal or 42-foot ditch (42EM4442), and one multicomponent site with an eligible prehistoric component (42EM4439). The non-significant sites include a historic and modern trash scatter (42EM4440) and two rock panels with historic inscriptions (42EM4441).

Applying the *Criteria of Adverse Effects* per 36 CFR 800.5.a.1, the NRCS has determined that the proposed rehabilitation will adversely affect the Tusher Diversion Dam and the East Side Canal. The NRCS will continue to consult with the Utah SHPO and other consulting parties to develop a treatment plan to mitigate or minimize adverse effects to the sites. Other participants in the process will include the Price, Utah, Bureau of Land Management Field Office, the Division of Forestry Fire and State Lands, the Ute Tribe of Utah, private landowners, and the Advisory Council for Historic Preservation. The agreed upon treatment plan will be formalized in a Memorandum of Agreement (MOA).

As the lead federal agency for this project, the NRCS invites your comments regarding project plans and the affects implementation may have on the associated historical resources. If you have any questions, comments, or concerns, please contact Grant Carlos Smith, Cultural Resources Specialist, at 435-637-0041 ext. 119 at your earliest possible convenience.

Sincerely,

DAVID C. BROWN
State Conservationist

Enclosure

cc: (w/o encl)
Elise Boeke, State Resource Conservationist, NRCS, Salt Lake City, Utah
Bronson Smart, State Conservation Engineer, NRCS, Salt Lake City, Utah
Barry A. Hamilton, Assistant State Conservationist-Field Operations, NRCS, Price, Utah
Andrew M. Williamson, Cultural Resources Specialist, NRCS, Salt Lake City, Utah
Grant Carlos Smith, Area Cultural Resources Specialist, NRCS, Price, Utah

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Forestry, Fire and State Lands
BRIAN L. COTTAM
Division Director / State Forester

January 31, 2014

David C. Brown
State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
Wallace F. Bennett Federal Building
125 South State Street, Room 4010
Salt Lake City, Utah 84138-1100

Dear Mr. Brown,

By virtue of its sovereignty, the State of Utah owns the bed of Green River below the ordinary high water mark at statehood from the boundary between Townships 23 and 24 South (approximately the mouth of the San Rafael River) down to the confluence of the Green and Colorado Rivers, excepting the portion within the boundaries of Canyonlands National Park; between the point at which the Green River exits the boundaries of Dinosaur National Monument (Mile 312 above the confluence of the Green and Colorado Rivers) to the mouth of Sand Wash (Mile 212.7 above the confluence of the Green and Colorado Rivers); and between the point where the river emerges from Gray Canyon (Mile 129 above the confluence of the Green and Colorado Rivers) to the boundary line between Townships 23 South and 24 South (Mile 95 above the confluence of the Green and Colorado Rivers).

As provided for in Utah Administrative Code Subsections 65A-1-2 and 65A-10-1, the Division of Forestry, Fire and State Lands (FFSL) is the agency authorized to manage sovereign lands within the State of Utah, including the Green River. Sovereign lands are managed under multiple-use/sustained-yield principles and the Public Trust Doctrine as directed by statute. In order to meet this mandate, FFSL must ensure that all uses on sovereign lands are regulated such that protection of navigation, fish and wildlife habitat, public recreation, and water quality are balanced against the economic necessity or benefit to be derived from any proposed use.

FFSL appreciates the invitation to participate in the consultation process. After reviewing the cultural resources report FFSL concurs with the determination of archaeological site eligibility and the determination of project effects to the archaeological sites. FFSL looks forward to working as a cooperating agency with the Natural Resources Conservation Service (NRCS) to fulfill its obligations under the National Environmental Policy Act and the National Historic Preservation Act. As a cooperating agency, FFSL will work with the NRCS and the other consulting parties to resolve the adverse effects to the historic properties impacted by the proposed undertaking. FFSL will have a representative present at the meeting at the Tusher Diversion on February 6, 2014.

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If you have any questions or need additional information please contact me at 801.538.5540 or lauraault@utah.gov. You may also contact Alison Lerch, the Division's Sovereign Lands Coordinator based in Moab, at 435.210.0362 or alisonlerch@utah.gov.

Sincerely,

Laura Ault

Laura Ault
Sovereign Lands Program Manager

From: Williamson, Andrew - NRCS, Salt Lake City, UT
<andrew.williamson@ut.usda.gov>
Sent: Tuesday, February 11, 2014 3:11 PM
To: greg.allington@mcmillen-llc.com; Aimee Hill (aimee.hill@mcmillen-llc.com); annalee@etv.com; Dale Gray (dalegray@mindspring.com); John W. Jones; alisonlerch@utah.gov; Christopher Hansen (clhansen@utah.gov); gra@etv.net; akoski@blm.gov; davecusr@frontiernet.net; tmickelson@utah.gov; farming500@yahoo.com; Urie, Wayne - NRCS, Castle Dale, UT; Christopher Merritt (cmerritt@utah.gov); Cory Jensen (coryjensen@utah.gov); fedranch@yahoo.com; Beals, Anthony - NRCS, Salt Lake City, UT; Barton, Roger - NRCS, Castle Dale, UT; laurel.nielsen@ut.uacdnet.net; Smith, Grant - NRCS, Price, UT; Hamilton, Derek - NRCS, Salt Lake City, UT; Smart, Bronson - NRCS, Salt Lake City, UT
Subject: Green River Diversion Rehabilitation Cultural Resources Meeting Notes

Good afternoon, friends.

If you are receiving this it is because you were present at last Thursday's meeting at the Hastings Ranch to discuss the cultural resources mitigation process for the Tusher Diversion. I wanted to thank you all once again for your participation in that meeting. I feel that there were a number of great ideas that were brought forth for consideration, and I also feel that we are very on-the-mark in finding a balanced approach to the mitigation process. Please find attached to this email a summary of the points that were discussed at last Thursday's meeting. While there were several general ideas that were floated, I distilled the information down to a series of tangible elements that can be used as a basis for coming up with our mitigation plan. If you see anything that is missing from my notes, please let me know and I will amend the document accordingly. As discussed in the meeting, I would appreciate promptness in your responses (should you have any) so that we can keep the ball rolling.

Thank you once again for your ongoing interest in this project. I look forward to working with all of you on this rehabilitation project and am happy to answer any questions or address any concerns that you might have.

Regards,

Andy

Andrew M. Williamson, MS, RPA
Archaeologist, State Cultural Resources Specialist
United States Department of Agriculture
Natural Resources Conservation Service
Wallace F. Bennett Federal Building
125 South State Street, Room 4010
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Green River Diversion Rehabilitation Project Section 106
Public Meeting Notes 2/6/2014

Mitigation Plan Overview

- Mitigation must be conceived and completed in relative proportion to the overall scale of the project
    - Grandiose, epic mitigation is incongruous with the scale of the undertaking
- Mitigation must focus on cost-effective measures that do not burden the project sponsors, local community, farmers, or ranchers
    - Common sense mitigation approach that balances the needs to the participants in the Section 106 process with the resources (financial or otherwise) that are available
- Mitigation must effectively capture those aspects of the Tusher Diversion Irrigation Complex and surround area that are being lost or altered by the proposed rehabilitation
    - History of the Tusher Diversion Irrigation Complex, the architectural uniqueness
        - Much of the history has been explored on a cursory level, but there are a lot more sources that can be checked
        - The architecture is unique, but has never been formally documented and is not fully understood.
- Mitigation must provide a means of giving back to the public
    - Interpretation, Outreach, and Education

Addressing the History of the Tusher Diversion Irrigation Complex- Deliverables:

1. Complete additional archival research of the Tusher Diversion Irrigation Complex
    a. Focus on information available at the John Wesley Powell Museum in Green River, the Museum of Moab in Moab, the Utah State Historical Society, and the J. Willard Marriott Library at the University of Utah
    b. Additional review of information at the Museum of the San Rafael in Castledale, Utah, the Utah State University Eastern Library and Prehistoric Museum in Price, and the Merrill-Cazier Library at Utah State University in Logan, as appropriate.
    c. Use JoAnn Chandler (J.W. Powell River History Museum) as focal point for data collection
        i. Knows materials, contacts better than just about anyone.
    d. Can also coordinate with Grant Smith (NRCS) on a situational basis.
2. National Register Nomination of the Tusher Diversion Irrigation Complex
    a. Could include the Tusher Diversion, the Canals, and the Hastings Ranch
3. Synthesize the historical information on the Tusher Diversion Irrigation Complex into a publishable article
    a. Most appropriate source for the publication may be the Utah Historical Quarterly.
    b. Will centralize and simplify information from the data collection process (IMACS forms, NRHP nomination, HABS/HAER documents, etc.) into a public-friendly document.
    c. Will exist in perpetuity through the Museums, Historical Societies, Libraries, and will exist online.

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Addressing the Uniqueness and Architectural Characteristics of the Tusher Diversion Irrigation Complex- Deliverables:

1. Complete archaeological monitoring of the removal of the Tusher Diversion and affected portions of the East Side Canal.
    a. Focus on collecting data regarding the design and materials used to construct the original structure
        i. Idea is to arrive at a 'reverse-engineered' schematic rendering of the structure to the extent that it is possible
    b. Determine the presence or absence of any previous versions of the Tusher Diversion within the river channel
    c. Document any other unknown archaeological resources associated with the diversion if any are discovered during the removal of the diversion
2. Complete Level 2 HABS/HAER documentation of the affected historic properties
    a. Review existing archaeological and engineering data prior to commencement for adequacy
    b. Gather additional data (photographs, measurements, descriptions, etc.) as appropriate to complete documentation to professional standards.
3. Complete an archaeological monitoring report detailing the results of the removal process.
    a. Submit to the Utah SHPO and consulting parties to close out the process
    b. Will include updated archaeological site record information

Addressing the Public Aspects of the Tusher Diversion Irrigation Complex- Deliverables:

1. Hold a public outreach meeting for the rehabilitation nproject at the John Wesley Powell Museum in May 2014 in association with Utah Archaeology Week
    a. Present a paper & public lecture on the history of the Tusher Diversion
    b. Invite the public to bring in photographs, newspapers, journals, etc. of the diversion to share
        i. Make scanners, copiers available for data collection
    c. Collect names and contact information of participants with anecdotes, stories, or accounts of the Tusher Diversion's history.
        i. Can follow up for later oral interviews if necessary.
    d. End presentation with a tour of the Hastings Ranch and Tusher Diversion site
        i. Pending land owner consent
2. Install a permanent exhibit at the John Wesley Powell River Museum detailing the history of the Tusher Diversion Irrigation Complex
    a. Museum has agreed to donate a 10-ft-wide x 6-ft-deep display area in the basement of the museum for the display
        i. Could be condensed into a smaller space if need be
    b. Contents of display remain up in the air
        i. Could include a model/replica/diorama of the diversion and surrounding area
            1. Would detail aspects of construction
            2. Any such exhibit would need to be covered due to the number and age of the participating visitors…
    c. Display would feature interpretive signage that discusses the history of the diversion and its role in the economic and agricultural development of the Green River area.

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Addressing the Public Aspects of the Tusher Diversion Irrigation Complex- Deliverables (continued):

3. Install an interpretive kiosk for the Tusher Diversion Irrigation Complex on BLM property on the west side of the Green River (Pending)
    a. Provides visitors with additional information on the structure and its history
    b. Re-directs the public away from the east side of the river

Other historical preservation considerations:

1. Maintain the historical fabric of the location by incorporating elements of the original design of the Tusher Diversion into the rehabilitated version
    a. Shape, location, water flow, etc.

DRAFT MEETING MINUTES

McMILLEN, LLC

To:	File	Project:	Green River EIS
From:	Dan Axness	Cc:	File
Date:	February 13, 2014	Contract No:	
Subject:	NRCS Green River EIS-Boat Passage		

1.0 INTRODUCTION

1.1 Purpose

The purpose of these meeting minutes is to document the major discussion points from the February 13, 2014 meeting regarding the downstream recreational boat passage (boat passage) for the Green River EIS and Concept Design project.

2.0 ATTENDEES

3.0 MEETING AGENDA ITEMS

3.1 Concept Design and Preferred Alternative

Dan Axness presented the concept design and preferred alternative. The preferred alternative at the time of the meeting consisted of:

- Replacing the diversion structure in place
- Providing three downstream fish passage notches and an upstream fish passage channel at river left (the east side of the Green River)
- Fish detection sensors (PIT Tag detectors) in the fish passage channel and the fish passage notches
- Providing a boating channel with a tilting weir gate to the east of the fish passage channel
- Sediment sluice and debris passage gates at each end of the diversion structure

3.2 Boat Passage Alternatives

The discussion was opened about other possible boat passage alternatives including:

- Boat passage on the left bank as shown in the preferred alternative
- Boat passage in the middle of the structure (near the existing middle fish passage notch)
- Boat passage on the right bank

A discussion ensued regarding the radial gates (used for sluicing sediment and passing debris) operating near boat passage; significant concern about boater safety was expressed by the boaters and the irrigators.

In addition, concern was voiced about boats exiting the boat passage on the left side of the dam and getting stranded due to lack of water on the Tusher Wash sediment deposit. Also, if the boats did not get stranded on the sediment deposit there was concern about sufficient flow and depth being available to allow boat passage just downstream of the dam.

The boater preferred the middle location option.

The water users preferred the middle location also.

3.3 Water Rights, Fish Passage and Boat Passage

Dan discussed the various adjudicated water rights (irrigation and hydropower), the navigability requirements by the State of Utah and the requirement for fish passage by the Endangered Species Act. Dan also presented the information pertaining to the Record of Decision (ROD) for the Environmental Impact Statement (EIS) addressing the operation of Flaming Gorge Dam. Following this information, Dan presented a graph of the flow at the USGS Green River gage from the year 2000 until present. During the period of record from 2000 to 2014, a few days during 2002 did not have sufficient flows to meet all of the demands. These days were in January when fish passage is not as critical and boating is unlikely (due to significant coverage of ice). Since the ROD there have been no days on the gage record (during the growing season, boating season and fish passage season) where the flow measured did not meet all of the competing interests.

The water users confirmed that this was the case from their experience.

3.4 Additional Topics

None

3.5 Action Items

McMillen will discuss the middle boat passage location with the Recovery Program.

McMillen will include the middle boat passage option in the EIS.

McMillen, LLC

To:	Meeting Attendees	Project:	Green River Diversion Rehabilitation EIS
From:	Dan Axness Greg Allington McMillen, LLC	Cc:	File
Date:	February 18, 2014	Contract No:	AG-8D43-D-13-0007
Subject:	NRCS Green River Diversion Rehabilitation EIS Meeting Minutes		

1.0 INTRODUCTION

This memorandum documents the meeting held on February 18, 2014. The meeting started at 2:00 pm and was adjourned at approximately 3:00 pm. The following people were in attendance:

Name	Organization
Greg Allington	McMillen, LLC
Dan Axness	McMillen, LLC
Aimee Hill	McMillen, LLC
Laura Ault	FFSL
Allison Lerch	FFSL
Melissa Trammel	NPS
Dave Speas	BOR
Tony Beals	NRCS
Floyd Johnson	BLM
Jeff Brower	BLM

2.0 MEETING DISCUSSION POINTS

2.1 Status of EIS and Comments/NEPA Coop Agency

- Draft EIS March 10 – Issued for public comment.
- Draft EIS Coop Agency – Still working with BLM, USACE, USFWS (nothing back from USACE, BLM still pending).
- Boat Passage – Dan Axness: With flows from Flaming Gorge, no need for a mechanical weir for boat passage. State of Utah: Boat passage over dam is necessary (navigability) public trust.
- Separate meetings to discuss water allocations (Dave Speas to send BOR contacts).
- Boat passage in center is preferable.
- Send Dave Speas hydrologic write-up about hydrology and correlation to Flaming Gorge.

2.2 Cultural Meeting

- Treatment plan being drafted, MOU Pending.
- Sending package to ACHP.
- Andy finalizing and coordinating with relevant parties.

2.3 Boating Meeting

- Flaming Gorge flows modified by 2006 ROD/BO to allow for razorback sucker larvae. Base flows modified during summer months for consistent flows. Allowance in Reach 3 to go below 25% in low flow years (975 cfs to 1625 cfs).
- The placement of passage can have all the functions at the same time. Current users confirmed that 200 cfs could be used for passing.
- Boat passage location – No need for a gate associated with boat passage. 2002 low water year – may need to keep gates to make sure that passage was closed off in low flows.
- Combination boat/fish passage – PIT tag detectors in notch, no problems anticipated.
- Park Services – How much water needed? 20-30 cfs.
- Dan – Stop log options to block it off.
- Dave – There is an allowance to go ±25% of target flow in Reach 3. Low end 975 cfs emphasis on upstream reaches, often difficult to reach target.
- Dan – Will talk to people in Provo. Further analysis needed. Pumps downstream – look at how water is being allocated in area.
- Rec. Program McAbee – Do not reduce effectiveness of fish passage.
- Ault – Navigability is a must. Not negotiable. Cannot permit the structure without navigability.
- Dan – Probabilities of occurrence – how many days per year in a dry year? Hydrologic model based on gage at Green River, used measured flows.
- Passage – center location preferable for safety and accessibility.

3.0 NEXT MEETING

The next meeting is scheduled for March 3, 2014 at 2:00 pm.

4.0 MEETING ADJOURNED

The meeting was adjourned at approximately 3:00 pm.

DRAFT MEETING MINUTES

McMILLEN, LLC

United States Department of Agriculture

To:	Meeting Attendees	Project:	NRCS Green River EIS
From:	Dan Axness Greg Allington McMillen, LLC	Cc:	File
Date:	March 3, 2014	Job No:	AG-8D43-D-13-0007
Subject:	NRCS Green River EIS – Meeting Minutes		

1.0 INTRODUCTION

This memorandum documents the meeting/coordination call held March 3, 2014. The meeting started at 2:00 pm and was adjourned at approximately 3:00 pm (MST). The following people attended the meeting:

Name	Organization
Tony Beals	NRCS
Roger Barton	UACD
Floyd Johnson	BLM
Jeff Brower	BLM
Bob Norman	BOR
Brent Uilenberg	BOR
Dave Speas	BOR
Laura Ault	FFSL
Melissa Trammell	NPS
Greg Allington	McMillen, LLC
Dan Axness	McMillen, LLC
Aimee Hill	McMillen, LLC
Kevin Jensen	McMillen, LLC

2.0 REVIEW OF PAST MEETINGS

2.1 Cultural Resources Meeting – February 6, 2014 at diversion.

- NRCS developing Draft Treatment Plan and MOA.

2.2 Boating Meeting – February 13, 2014 at city of Green River.

- Boat passage and fish passage was proposed in the center of the channel.

3.0 CONCEPT DESIGN

McMillen presented the hydrologic information developed for the boater meeting. The flows have been adjusted by the USDI BOR (2006) Flaming Gorge EIS and Record of Decision (https://www.usbr.gov/uc/envdocs/eis/fgFEIS/index.html). Water Allocations – 2006 ROD. Flows have been met since 2006 in Reach 3 to operate the diversion. Flows can be fluctuated ±40% from target values.

McMillen discussed that the boating community would prefer the boat passage in the center of the channel. Laura Ault emphasized that FFSL would prefer boat passage in the center of the channel as well.

Open discussion occurred about problems with debris removal, fish entrance conditions, and other access issues associated with the center of the channel fish passage and boat passage location. Roger Barton said irrigators are concerned about river left boat passage and the effects from Tusher Wash sediment deposition. Bob Norman is concerned about moving fish passage to the center and the ability to remove debris. Floyd Johnson does not think there is enough time to revise the Concept Design and Draft EIS to reflect a change in the passage location.

Recommendation and Decision – Keep the location of the fish passage and boat passage the same for the Draft EIS.

4.0 EIS APPROACH AND STATUS

BLM is still getting final approval and will be kept on as a cooperating agency in the Draft EIS. Draft EIS alternatives will remain the same. Draft EIS comment period will open on March 14, 2014. Draft EIS will be posted by NRCS to EPA website March 7, 2014. Draft EIS public meeting will be held at the John Wesley Powell River History Museum on April 10, 2014 at 6:00 pm.

The following newspapers will be contacted for Notice of Availability of the Draft EIS:

- Salt Lake Tribune
- Moab Times
- Emery County Progress
- Provo Daily Herald
- ETV 10 News (www.etv10news.com)

The next meeting/coordination call is scheduled for March 17, 2014 at 2:00 pm MST (meeting notice has been sent).

5.0 MEETING ADJOURNED

The meeting was adjourned at approximately 3:00 pm.