RECLAMATION
Managing Water in the West

Rehabilitation and Improvement of Crow Irrigation Project

Montana

Final Programmatic Environmental Assessment

January 2015

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

CROW TRIBE
Crow Tribe Water Resources

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Mission Statements

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The mission of the Bureau of Indian Affairs is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives.

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1.1 INTRODUCTION

The Crow (Apsàalooke) Tribe (Tribe), in coordination with the Bureau of Reclamation (Reclamation), proposes to rehabilitate and improve an existing irrigation system, the Crow Irrigation Project (CIP), within the Crow Indian Reservation (Reservation) in south central Montana, southeast of the city of Billings (**Figure 1-1**). Improvements include repairs to existing structures and canals, development of alternative irrigation systems on existing irrigated lands, and expansion of tribally-owned irrigated lands. The project would be implemented in prioritized phases over the next 10-20 years. The federal government authorized and funded the proposed work through Public Law (P.L.) 111-291 (Section 405). Reclamation is responsible for making a decision regarding the project as part of environmental review under the National Environmental Policy Act (NEPA) of 1969 (as Amended, 42 U.S.C. Sections 4221-4347). Because the proposed project would cross lands held in trust by the federal government for the Tribe, the Bureau of Indian Affairs (BIA), the federal agency responsible for decision-making related to these trust lands, may also either co-sign or adopt the final environmental document.

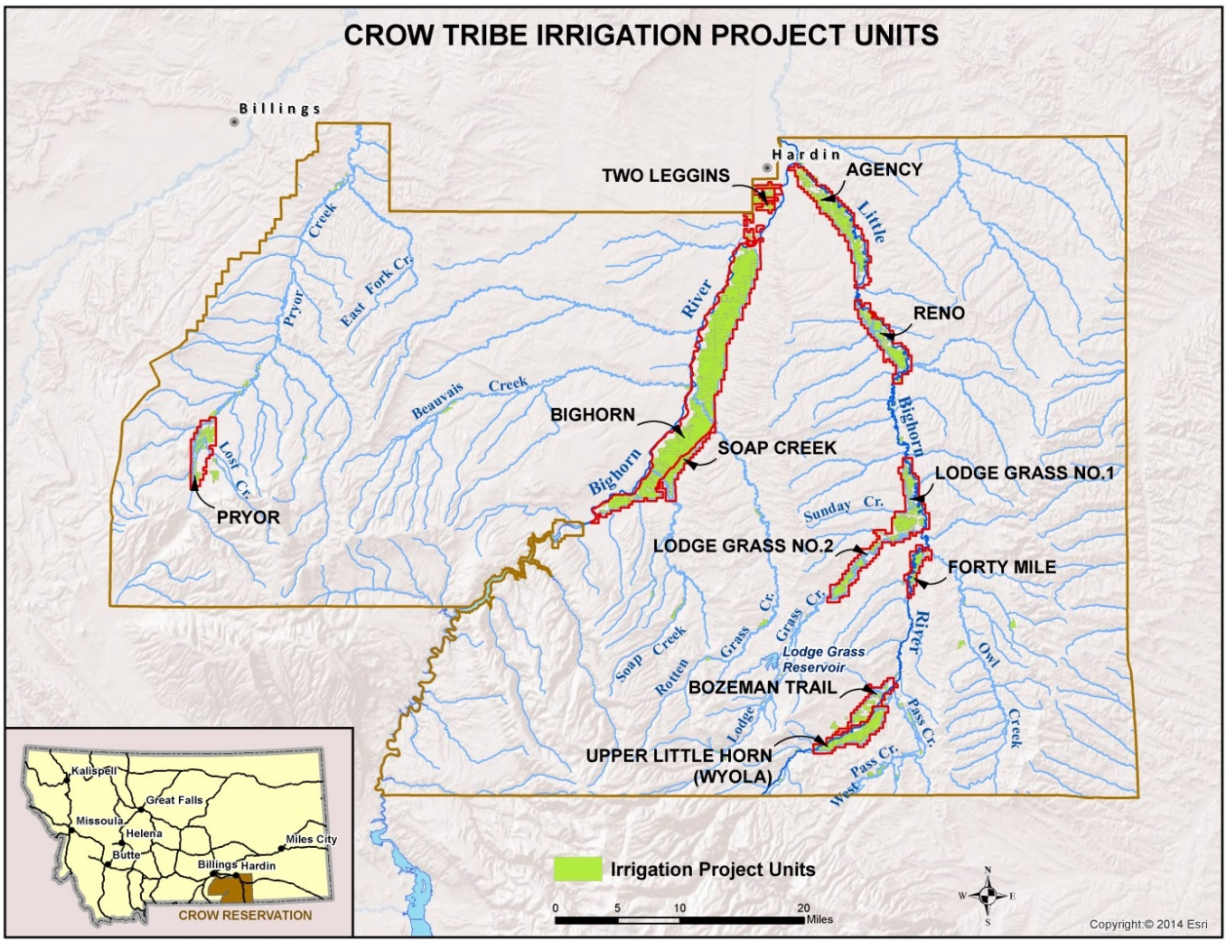

Figure 1-1: General Location of Project Area

The CIP is currently made up of 11 irrigation units (**Figure 1-1**). The Bighorn and Two Leggins Units divert water from the Bighorn River. The Soap Creek Unit diverts from Soap Creek. The Agency, Bozeman Trail, Forty Mile, Reno, and Upper Little Horn (Wyola) Units divert water from the Little Bighorn River. The Lodge Grass No. 1 and Lodge Grass No. 2 Units divert from Lodge Grass Creek, and the Pryor Unit from Pryor Creek. Of these 11 units, the Bozeman Trail and Two Leggins Units are privately owned and operated, with the remaining nine units operated and maintained by the BIA. There are 75,478 acres of land within the CIP boundaries for all eleven units.

Figure 1-2 illustrates the typical components of an irrigation project. Irrigation systems operate in two parts. The water conveyance system diverts water from a source (reservoir, river, etc.) and carries it to its destination through ditches (canals and laterals) and various structures that facilitate control of water through the system. The second part of the system is the application of water to the land, which is the responsibility of individual farmers. Annual fees are levied by the government on farmers using the CIP based on assessment of irrigable acres; the fees are used to operate and maintain the irrigation conveyance infrastructure (Fandrich 2007).

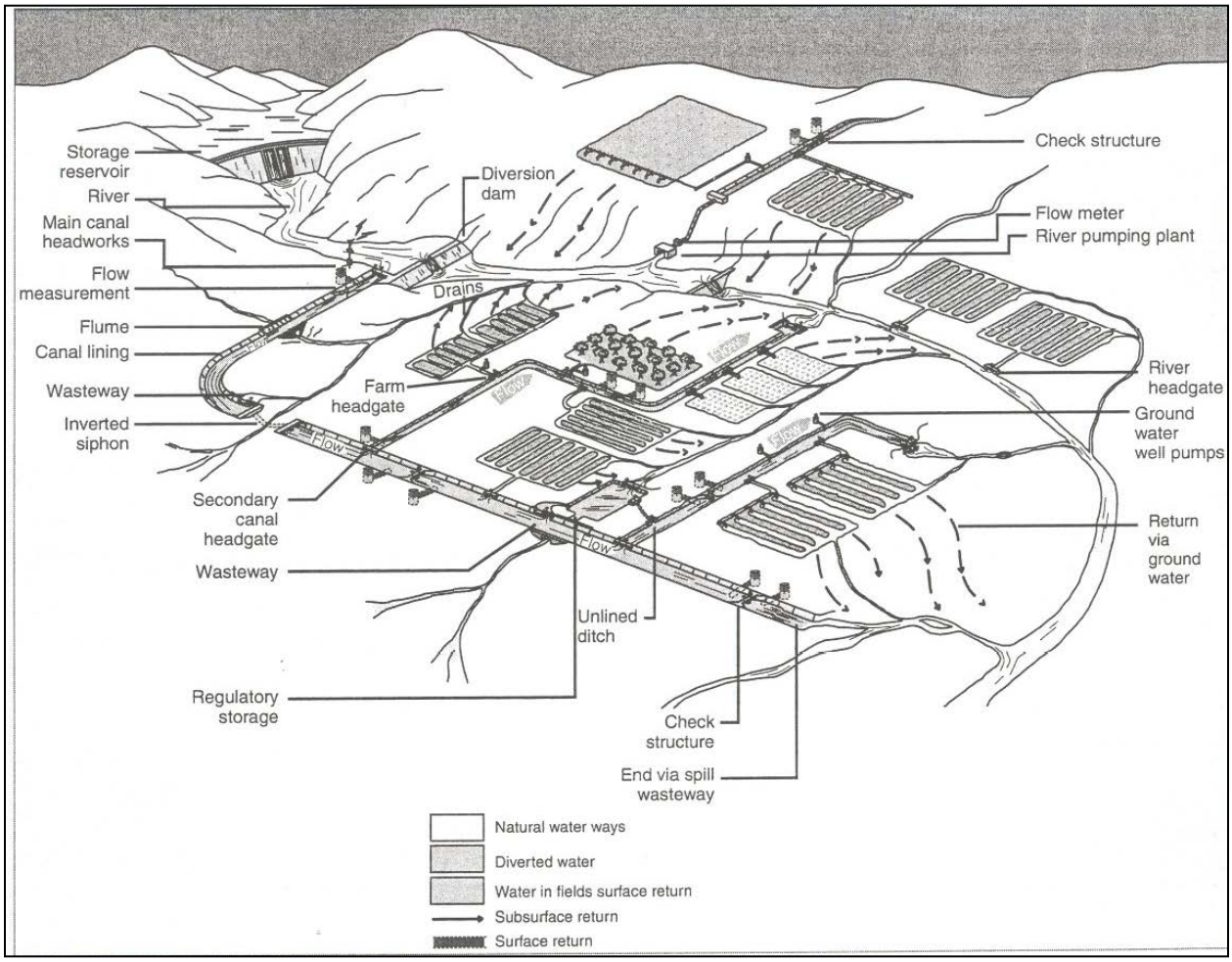

Figure 1-2: Typical Components of an Irrigation Project (Source: BIA 2008).

Across the eleven existing CIP units, there are 11 diversion dams, one storage dam (Lodge Grass Storage Reservoir), approximately 122 miles of main canals, 43 miles of drains, 257 miles of other canals (e.g.,

laterals, sub-laterals, and wasteways), and approximately 3,800 irrigation structures (including both BIA and non-BIA owned structures, such as checks, headgates, headworks, flumes, siphons, turnouts, road crossings, spillways, and diversion dams). All current irrigation units are gravity fed and lack automated flow measurement or gate controls.

1.2 PURPOSE OF THE PROPOSED ACTION

Project objectives were broadly defined in P.L. 111-291, Section 405(c), Scope, based on deficiencies described in initial engineering assessments (HKM 2007). The CIP Master Plan (Master Plan) (Bartlett & West 2014) further describes the current status and deficiencies of the project, while defining the main priorities of project improvement. Project objectives gleaned from these documents are listed below, along with possible measurement indicators:

1. To improve the irrigation capacity of the existing system.
   Indicators: Number of acres brought back into production; Change in number of canals with functional water flow; Percentage of temporarily non-assessable acres (TNA) compared to presently assessable acres (PA). (See definitions Section 2.3.2.)

2. To eliminate inefficiencies due to infrastructure.
   Indicators: Change in total volume of water used; Change in number of canals with functional water flow.

3. To improve the cost-effectiveness of delivery of irrigation water (Section 405(c)(2)).
   Indicators: Cost per unit-volume of irrigation water.

4. To reduce overall water consumption.
   Indicators: Change in total volume of water used; Acreage of flood irrigation lands compared to sprinkler/surge methods.

5. To improve the equitable distribution of water to allottees (Section 405(c)(2)).
   Indicators: Change in number/percentage of irrigable acres owned by tribal members; Change in number/percentage of tribal water users.

1.3 NEED FOR THE PROPOSED ACTION

The primary needs of the existing irrigation system are 1) to repair the infrastructure to provide reliable irrigation water deliveries, 2) improve the efficiency of the system, 3) improve the protection of natural resources, and 4) to provide mutual benefits for tribal and non-tribal users. Since there is more repair work than funds available, establishing project priorities will be a key factor for the users. It may not be necessary or desirable to rehabilitate the full extent of historical infrastructure serving the project area. Each need is explained in more detail below.

Figure 1-3: High Check Disrepair in Main Canal of Bighorn Unit

Irrigation on the Reservation dates back to the late 1800s, with the existing system installed by the 1940s. Maintenance of the system has not kept pace with aging infrastructure. Several engineering assessments have documented in detail the reduced capacity of the system, disrepair of system facilities, and operational inefficiencies (HKM 2007, Bartlett & West 2014). Current problems caused by failing structures include: water erosion; soil slumping; gates immovable, leaking, or not functioning; concrete deterioration; erosion of adjacent streambanks; equipment that is not user-friendly or difficult/dangerous to adjust; exposed rebar; and canal prism erosion. Further, a significant portion of the main canal and lateral canal system in the CIP requires substantial rehabilitation due to a lack of maintenance, with vegetation growth and siltation contributing to significant reductions in the flow capacities in some locations. Excessive vegetation growth can also contribute to additional water losses via deep percolation. A major ditch cleaning and reshaping effort needs to be implemented. Other issues include canal bank erosion by livestock, resulting in restricted flow capacities and compromised bank integrity, and a lack of a reliable water source in the Pryor Unit.

Figure 1-4: Canal Erosion in Upper Little Horn (Wyola) Unit

Currently, surface irrigation in the form of flood irrigation methods is the most common method used across the extent of the CIP. Conversion to more efficient irrigation methods could result in a reduction in water storage shortages and/or canal capacities as well as reduction in potential field runoff and the associated sediment load.

The combination of older design, poor condition, and uses of the irrigation system has led to some undesirable cumulative effects on natural resources. These are identified in Section 1.6, Key Issues. There is an opportunity and a need to improve and rehabilitate the project with modern standards for natural resource conservation.

The United States government holds a portion of the irrigated lands in trust for the Tribe and tribal members. Over time, changes in land uses and ownership on the Reservation have occurred such that the CIP now serves a larger number of non-tribal farmers compared to tribal farmers; therefore, improvements to the system must provide for expanded or future tribal uses.

1.4 REGULATORY FRAMEWORK

Routine repairs to existing irrigation projects are often made without extensive environmental reviews and public comment. For many routine CIP maintenance activities, there are no significant environmental effects and the BIA may categorically exclude these activities from further review under NEPA. However, the CIP is in need of major repair and public funds are being provided for extensive work. Section 404 of P.L. 111-291 requires project compliance with applicable environmental laws including review under NEPA.

1.4.1 Project Authorization

The CIP rehabilitation and improvement project was authorized as a component of the Claims Resolution Act of 2010, which included the historic Crow Tribe Water Rights Settlement (Settlement Act)

(Section 405, P.L. 111-291, December 8, 2010). The Settlement Act directed the Secretary of the Interior to execute the water rights compact between the Tribe and the State of Montana which had been underway for several years. On April 27, 2012, the Crow Tribe, the State of Montana, and the United States of America, through the U.S. Department of the Interior, signed the Water Rights Compact (Compact). The settlement provided for $131.843 million total for rehabilitation work and authorized the Tribe to proceed with design and construction of the project.

In implementing the Compact, the Settlement Act further directs the Secretary of the Interior to comply with the NEPA of 1969, the Endangered Species Act (ESA) of 1973, and other applicable federal acts and regulations. The Tribe has entered into a formal Public Law 93-638 agreement (638 Contract) with Reclamation that spells out the specific roles and responsibilities of both parties, which include the following:

- The Tribe agrees to perform activities required by NEPA and to assist Reclamation in assuring compliance with the National Historic Preservation Act (NHPA), Executive Order 11593, and the Archaeological and Historic Preservation Act (AHPA).

- Reclamation agrees to make final determinations under NEPA, and other laws, and conduct consultations required by the NHPA and the Native American Graves Protection and Repatriation Act (NAGPRA).

- Based on the CIP Agreement and Annual Funding Agreement, the Tribe will: 1) undertake preparation of NEPA documents and analyses, and 2) undertake cultural resource surveys for compliance with NHPA. Reclamation will: 1) review environmental and cultural resource compliance documents, 2) issue any finding of no significant impact (FONSI) or prepare an Environmental Impact Statement if necessary, 3) issue any decision document, and 4) conduct NHPA and NAGPRA consultations and related activities.

Reclamation and the BIA also have a responsibility to protect and conserve trust assets of the Tribe and Tribal members. This responsibility extends into providing oversight of the expenditure of appropriated federal project funds to best serve the interests of the Tribe and its members. Project review ensures that collective government actions taken by Interior agencies and the Tribe fulfill trust asset responsibilities while meeting environmental laws and regulations.

1.4.2 Project Documentation

Rehabilitation and improvement work would be guided by three related documents: 1) an implementation agreement, which defines project responsibilities (described in Section 1.4.1), 2) a Master Plan, which lays out the engineering framework for the rehabilitation and improvement of the CIP, and 3) a decision document prepared under NEPA. The NEPA document is used to inform decision-makers and the public of the proposed action, develop reasonable alternatives of project actions, and to summarize the environmental effects of the alternatives. A fourth but separate document would guide acquisition of needed land access to implement the project.

1.4.3 Programmatic Environmental Assessment

The Tribe has obtained professional services to prepare engineering master plans and environmental review that Reclamation will use to finalize and complete the project approval process. Design and construction of project facilities will be guided by the engineering Master Plan, which contains technical details about location, design, materials, methods, testing, and operation of the irrigation system. The Master Plan will be updated as new details are agreed upon and finalized annually, with a full review every three years. Annual work plans or unit work plans will be prepared by the Tribe before the start of each construction season and reviewed by Reclamation.

Because the project will be implemented in phases over a period of 10-20 years, a programmatic Environmental Assessment (EA) has been prepared. In a programmatic EA, general project work activities are analyzed while reserving review of the later phases of work. Future site-specific activities will be assessed when final detailed plans (e.g., annual work plans) are available. NEPA necessary for site-specific activities will be tiered to this programmatic EA. This programmatic EA will serve as a basis to determine if there are any significant environmental effects caused by the project and any necessary mitigation.

1.5 DECISIONS TO BE MADE

The Great Plains Regional Director for Reclamation will make a decision as part of the environmental review under NEPA. The decision will be programmatic, meaning the program-wide or recurring impacts of the project would be evaluated. This approach allows recurring activities of a phased project such as this, to be analyzed once rather than having to be analyzed repeatedly each time a site-specific project is proposed.

Specifically, Reclamation's decision would direct the following items:

1. How best to implement the Master Plan, including recommendation of conservation measures necessary or appropriate to reduce or avoid potential environmental impacts of the project. These are general measures that would be used to meet project-wide environmental goals.

2. To establish a process for analyzing and authorizing site-specific projects tiered to this programmatic analysis and the Master Plan.

3. To incorporate specific conservation measures in the design options reports and work plans as needed for a given site/area. Typically, a team of natural resources personnel would tailor recommendations based on field reviews and consultation with other agencies when necessary.

4. To establish a process to review and allow revisions to the Master Plan and general conservation measures provided that no substantial changes occur that would otherwise require supplementing the environmental review for a revised programmatic decision, or require further analysis of the project in an environmental impact statement.

5. To establish a process to document compliance with the project programmatic decision.

Because the proposed project would cross federal trust lands for which the BIA has decision-making authority, the BIA may also either co-sign or adopt the final environmental document.

1.6 KEY ISSUES AND PUBLIC INVOLVEMENT

Reclamation directives and NEPA provide for the identification of issues to be analyzed in depth (Reclamation 2012). Issues serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand. Issues are best identified during public involvement early in the process to help set the scope of the actions, alternatives, and effects to consider; but, due to the iterative nature of the NEPA process, additional issues may come to light at any time during the process.

1.6.1 Public and Agency Involvement

Public involvement and agency coordination are required as part of the NEPA process, to the extent practicable (40 C.F.R. §§ 1501.4(b), 1506.6(b)). Involvement begins with scoping to help determine the relevant issues for analysis in the EA. For this project, public scoping activities included mailings, website development, community notices, and three public input meetings. A separate mailing was sent to federal, state, and local government entities and one agency meeting was held. The scoping period officially closed February 28, 2014. Details of the scoping effort are included in Chapter 5, Consultation and Coordination. All public and agency comments received and the rationale for issue determinations are included in the Project Record.

1.6.2 Key Issues

In an EA, key issues are environmental effects of importance that focus the review. Often they are a blend of environmental, social, and economic concerns. Because key issues have an important role in planning a project, they should be addressed in the project's design. Many key environmental issues are addressed and resolved by using conservation measures for the project. Significant key issues are used to develop alternatives to the proposed action to reduce, minimize or avoid environmental effects.

Based upon information obtained through scoping, discussion with interested and affected parties, and existing laws and regulations, Reclamation identified the following resources, issues, or concerns as potentially relevant to the proposed actions. The programmatic EA proceeded with analysis of effects for the following key issues:

1) **Water Quality:** There are strong public concerns about the water quality of irrigation returns and runoff from eroded canals/banks into the river/stream systems, particularly for the Bighorn River, which has a popular trout fishery. Concerns include eroded silt and sediment concentrations, excess fertilizers and pesticides from cropland, increased water temperature, and waste from livestock. The reasons for these concerns include the impacts to the fisheries and other aquatic life, economic impacts related to recreation interests, and human use of the river. The overall opinion was support of the project, with a desire for additional measures to be taken or added to the system to further improve water quality.

2) **Socioeconomic Issues:** Several members of the public emphasized the link between the water quality of the Bighorn River, the health of the trout fishery, and the economic value of angling, service/accommodation, and other recreational/tourism-based businesses that the river provides. There was also public recognition of the economic value of the cropland irrigated by the CIP and general support of the project to provide socioeconomic benefits.

3) **Trust Benefits/Environmental Justice:** Public comment included concerns that the operation of the existing CIP has limited benefits to trust lands and Crow farmers/irrigators.

4) **Cultural Resources:** A number of CIP facilities are eligible for inclusion in the National Register of Historic Places. Irrigation system repairs require that a number of old structures be demolished and/or removed (resulting in a loss) before replacement with new structures can occur. If the proposed project includes the expansion of irrigated lands, or leveling or other major soil disturbance to presently irrigated lands, other types of cultural resource sites have the potential to be disturbed. The public also voiced concerns over impacts/destruction of Sundance sites and culturally significant plants and animals, such as willows, eagles, etc.

5) **Fisheries:** Fish passage and blockage was one of the key issues identified in engineering reports. The existing CIP has irrigation structures within river channels that are barriers for fish movement, primarily in an upstream direction. Some blockages may be important for protecting existing fish populations from invasion by non-natives. In addition some fish are lost to entrainment. Public concerns over water quality are mainly centered on the impact to fisheries and subsequent economic impacts to businesses dependent on the fisheries.

6) **Water Quantity**: A key consideration of the project, and one voiced by the public, is its effects on the Bighorn River system from changes in amount of water flow, including the potential effects to the fisheries reach of Bighorn River below Yellowtail Dam. Members of the public also discussed the lack of water in the Pryor system.

7) **Wetlands:** Drainage and seepage from existing irrigation systems has contributed to the development of wetlands. Reducing or eliminating seepage through lining of systems as part of the proposed project may have a direct effect on those wetlands. The public in general seemed to consider the existing/created wetlands valuable for filtering irrigation wastewater.

8) **Soil Conservation**: Sensitive soils and hazard areas are a safety concern for construction work. Excavated soils need to be properly managed to ensure productivity for site restoration. Effects of irrigation on soils (e.g., water-logging, salinity increases, etc.) from added irrigation may adversely affect farm soil productivity. Public concern regarding soil resources was focused on erosion issues and sediment discharge of the existing system.

9) **Noxious Weeds**: Ground disturbance activities may lead to of noxious weed establishment, proliferation, and spread. New and/or additional weeds may emerge at disturbed sites. Spread via equipment may be a concern.

Several concerns or resources were identified as potential key issues in preliminary analyses. Upon further review, these issues were determined to be relevant, but not resulting in measurable or major

impacts. These issues/resources are described and analyzed in the EA, but not to the degree or depth of the key issues:

- Air Quality
- Climate Change
- Terrestrial Wildlife
- Threatened and Endangered Species
- Vegetation Communities & Land Cover
- Paleontological Resources
- Floodplains

1.6.3 Non-Relevant Issues

Other issues were identified early in the project planning and scoping process that were determined, upon further analysis, to not be relevant to the project actions. A discussion of these issues and the rationale for why they were determined to not be pertinent are summarized in the Project Record.

1.7 JURISDICTION AND PERMITS

As a project proposed by the Crow Tribe within the boundaries of the Crow Reservation, the primary regulatory jurisdiction of the project is that of the Tribe. All laws of the Tribe, including environmental laws and regulations, must comply with applicable federal law. In cases where the Tribe has not yet established or enacted laws, standards, or programs for protection and management of environmental resources, federal jurisdiction and permitting would apply. The State of Montana has limited jurisdiction on the Reservation, however; the riverbed and banks of the Bighorn River were ruled to be under the jurisdiction of Montana in a 1981 Supreme Court ruling (Harris 2013a).

The Tribe has an Environmental Policy Act that mirrors the federal environmental review process under NEPA (CLOC Title 24, Chapter 2; Harris 2013b). Aside from formal laws, the Crow tribal culture is one that in general places value and importance on the natural world; the connection of plants, animals, and the elements to human life; and on analyzing the effect of present actions on future generations (Reed 2002).

Jurisdiction and permitting requirements anticipated for the project are summarized in **Table 1-1**. Required consultation and agency involvement is introduced in Section 1.6 and summarized in Section 5.0, Consultation and Coordination. The necessity of certain state and local permits will be determined upon final design.

Table 1-1: Environmental Laws That May Require Consultation or Permitting

Oversight Agency	Statute	Action-Forcing Device
US Environmental Protection Agency	Clean Water Act, Section 402	National Pollutant Discharge Elimination System Permit for disturbance more than one acre. Would be obtained prior to construction.
	Clean Air Act, Section 112	National Ambient Air Quality Standards met. No permit required.

Oversight Agency	Statute	Action-Forcing Device
US Army Corps of Engineers, Billings Regulatory Office	Clean Water Act, Section 404	Dredge or fill of navigable waters, including some wetlands, may require permit. Exemption for wetlands formed within irrigation canals. Required permits would be obtained prior to construction.
	River and Harbors Act, Section 10	
US Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)	Food Security Act, Wetland Conservation Provision;	If a wetland were dredged or filled for the purpose of producing a commodity crop, USDA program benefits could be denied or revoked. Consultation with local NRCS office.
	Farmland Protection Policy Act	Conversion of farmland to non-agricultural use. Not applicable.
Tribal Historical Preservation Office (THPO)	National Historic Preservation Act, Section 106	Consultation with THPO required. Permits for excavation and construction may be necessary.
US Fish and Wildlife Service (USFWS)	Endangered Species Act	Consultation with USFWS required.
	Migratory Bird Treaty Act	
	Bald and Golden Eagle Protection Act	
	Fish and Wildlife Coordination Act	
	National Wildlife Refuge System Improvement Act	No refuges impacted. Not applicable.
	Wetland and grassland easements	Consultation with USFWS recommended.
Montana Department of Natural Resources and Conservation	Montana Natural Streambed and Land Preservation Act	310 Permit potentially applicable for work on Bighorn River.
	Montana Land-use License of Easement on Navigable Waters	Potentially applicable for work on Bighorn River.
Montana Fish, Wildlife and Parks (MFWP)	Montana Stream Protection Act (SPA)	SPA 124 Permit potentially applicable for work on Bighorn River.
Montana Department of Environmental Quality	Short-term Water Quality Standard for Turbidity	318 Authorization potentially applicable on Bighorn River.
Montana Department of Transportation (MDT)	N/A	Permit required for work within MDT right-of-way. Consultation with MDT required.
Federal Emergency Management Agency, Local Floodplain Administrator	National Flood Insurance Program	New development, including irrigation facilities, within a designated Special Flood Hazard Areas must apply for a Floodplain Development Permit. Potentially applicable for Bighorn River.

2.0 Description of Proposed Action and Alternatives

2.1 INTRODUCTION

This chapter describes the alternatives for the project and discloses the alternative's environmental impacts and achievement of the project purpose and need (Section 1.3). The Settlement Act recognized the existing and projected conditions of the CIP and took action to serve agricultural interests and socio-economic needs by authorizing major funding for continued service of the irrigation system. Consequently, the decision to implement the project has already been made and therefore a "No Action" alternative was not anticipated. The decision analyzed in this document is not whether to rehabilitate the CIP, but how best to do it. A simple description of the "No Action" alternative and its anticipated effects are presented here for general comparison (Sections 2.5 and 2.6, respectively).

2.2 PROPOSED ACTION ALTERNATIVE

The Settlement Act requires Reclamation and the Tribe to negotiate a final master engineering plan and implement the rehabilitation and improvement of the CIP. Over the next 10-20 years, key rehabilitation and improvement work will be undertaken based on irrigation system priorities. Reclamation shall serve as the lead agency with respect to any activity to rehabilitate or improve the water diversion or delivery features of the CIP. The Crow Tribe, Reclamation, and the BIA would coordinate annual work activities and budget allocations until funds are expended and the project is finalized. Management of normal operation and maintenance of the CIP will be continued by the BIA.

2.2.1 Planning and Design Actions for the CIP

2.2.1.1 Administration of Project Funds

The 638 Contract with the Tribe (signed in September 2012) established the process for preparing annual budgets and scheduling project activities. Each year, Reclamation and the Tribe negotiate and sign an Annual Funding Agreement (AFA) that documents the Tribe's administration and expenditure of project funds. Agreements for 2013 and 2014 were completed for work in progress. Signing AFAs for the project is considered an administrative action.

2.2.1.2 Review of Engineering Master Plan

The CIP Master Plan is a key document required for overseeing the entire job of repair and improvement work. Preparation of the plan is the responsibility of the Crow Tribe. Reclamation has the responsibility to provide technical assistance by reviewing the plan for consistency with industry standards for design and construction.

2.2.1.3 Easements and Land Acquisitions

Some CIP facilities may be relocated or reconfigured and a corresponding change in access may be necessary and temporary access across lands may be required (these actions are identified in Section 405 of the Settlement Act). The Tribe is responsible for negotiation and draft documentation of all acquisitions of land, rights-of-way, and easements. The United States is responsible for approval and execution of the acquisition documents prepared by the Tribe. The United States would hold title for the easements and rights-of-way in trust for the Tribe. There would be no costs to the United States for easements acquired for Tribal lands or from project water users who own the lands.

2.2.1.4 Review of Conservation Measures

Conservation measures have been developed as part of the proposed action alternative to minimize anticipated environmental impacts from the project. Reclamation would review the set of conservation measure options and coordinate a process for incorporating the measures in site-specific design option reports and work plans.

2.2.2 Construction Actions for the CIP

The five overall proposed CIP rehabilitation and improvement phases, in order of priority, are:

1) Rehabilitation/Betterment of CIP Structures
2) Rehabilitation/Betterment of CIP Canals and Laterals
3) Alternative On-Farm Irrigation Systems
4) Purchase of Fee Lands
5) Developing Irrigation on Future Trust Lands – Dunmore Bench

Each of these five project phases would involve a variety of construction activities, with the exception of Phase 4, Purchase of Fee Lands, which does not involve construction. Each phase and a description of on-the-ground actions are described in the following sections.

Prioritization of Project Actions
The proposed CIP work is limited by allocated funds; therefore the work would be prioritized. In general, higher priority projects are those critical to the efficient operation and water conveyance of the current CIP system; these would be undertaken first. Lower priority improvements, such as on-farm improvements and land acquisitions, would be done later in the project. These priorities may change as the project progresses at the discretion of the Tribe. It is also possible that lower priority projects may not be implemented at all under the CIP project and allocated funds, but could be accomplished in part through other funding avenues as a future action. However, all potential work is addressed in the programmatic EA because it was part of the original engineering report used in legislative direction.

Within each of the five main phases, sub-projects would also be prioritized. A detailed priority index system would be used to develop the priorities (described in the Master Plan), as well as public input. The final prioritization would be at the discretion of the Tribe. In general, priority would be given to projects that affect 1) the largest amount of tribal or allotted acres; 2) PA lands; and 3) TNA lands may also be prioritized in combination with other information. PA lands are acres of land served by one of

the irrigation facilities which assess operation and maintenance charges. TNA lands are lands that cannot be cultivated profitably due to a present lack of water supply, proper drainage facilities, or need of additional construction work. Generally speaking, projects at the beginning of a main canal will serve more lands and would be given higher priority. Projects at the end of laterals will serve fewer lands and would be given lower priority.

Timing of Project Work

In general, the irrigation season would dictate the construction schedule for work within the canal prism, which makes up the bulk of project work. Most construction would occur before/after the CIP irrigation season, which runs from April 15th to October 15th during average years, however, both of these dates can shift several weeks from year-to-year. There will be some instances where it may be feasible to complete rehabilitation work on smaller lateral canals during the irrigation season. Other types of work outside of the canals, such as site preparation and road improvements, could be completed during the irrigation season.

2.2.2.1 Rehabilitation and Betterment of CIP Structures

There are approximately 3,775 total irrigation structures in the CIP, including approximately 3,300 BIA and 475 non-BIA owned structures; several thousand have been identified as in need of repair in the current Master Plan (Bartlett & West 2014). The proposed options to address these problems include rehabilitation, replacement, removal, or abandonment/no action. Refer to **Figure 1-2** for an illustration of some of these types of irrigation structures.

Structures within scope:
Checks
Check/waste structures
Chutes
Crossings
Diversion dams/boxes
Drops
Flumes
Headgates/Headworks
Outlet structures
Pumps
Siphons
Spillways
Trash racks
Turnouts

Structures *NOT* within scope:
Baskets
Bridges
Drain inlets
Measuring devices
Misc. structures
Pipes
Railroad crossings
Underdrains
Waterboxes
Road crossings

The typical sequence of construction activities for rehabilitation or replacement of CIP structures would be as follows. Vegetation would be cleared and grubbed adjacent to the existing structure and where necessary to the extent of the outside toe of the canal bank. Topsoil would be stripped and stockpiled; cleared and grubbed material and/or stripped sod may be stockpiled or disposed of at contractor-secured site. Unrepairable concrete would be demolished and removed. Subsoil would be excavated and stabilized around the structure. Excavations would be to the depths and widths necessary to accomplish the construction and would conform to safety standards. The structure would be repaired or replaced. Precast or cast-in-place concrete may be installed. Soils would be backfilled, graded, and compacted to site-specific needs. Site grading would be done to conform to design grades and minimize erosion. Topsoil would be replaced and dressed. Seeding and mulching would be done where earth has been disturbed outside of the canal prism, mostly on the outside of steep canal banks. Riprap may be used to protect soils around structures and canal banks from erosion. Other erosion control measure would be implemented where necessary. Refer to **Table 2-1** for details of the function of each type of irrigation structure and any specific construction steps.

Table 2-1: Types of Irrigation Structures and Specific Construction Activities

Type of Irrigation Structure	Purpose of Structure	Specific Activities
Conveyance Siphons, Flumes, Drops, Chutes	Designed to safely transport water across varying topography and natural and manmade features. Control erosion by dissipating the energy of moving water. Most siphons across the CIP are inverted siphons, and are below-ground structures.	None.
Regulating Headworks, Diversion Dams, Checks, Check-Drops, Turnouts, Diversion Structures	Regulate water flow passing through the structure, regulate the upstream water surface elevation, or both. Check-Drops serve as both regulating and conveyance structures. Headworks serve to regulate flows entering the canal system from a natural stream, often in combination with diversion dams. Turnouts divert water from a supply channel to a smaller channel or lateral (typically on-farm).	Work within waterways at headworks/diversion dams is anticipated within the Little Bighorn River, Lodge Grass Creek, Sunday Creek, Pryor Creek, and Lost Creek; no work is planned within the Bighorn River. Water from natural stream channel would be diverted around structure to provide a dry construction area. Native gravel and cobble material would be excavated and stockpiled onsite and returned and used to return natural channel to preconstruction condition. Diverted water would then be returned to the normal channel.
Protective Wasteways, Cross-Drainage Structures	Protect the canal system from damage resulting from storm runoff, drainage into the canal, or excess water in the canal system. Wasteways serve to release excess water from the canal system while cross-drainage structures serve to control drainage water entering or crossing the canal system.	Rehabilitation of wasteways may involve placement of riprap in the waste stream channel, and potentially grouted riprap.
Water Measurement Flumes, Stilling Wells, Weirs, Open Flow Meters	Measure flow through the canal system.	Would be incorporated where possible, depending on funding. Actual automation of facilities would be dependent on future BIA management decisions.

Pryor Unit – Pump System

The unreliable water source at the Pryor Irrigation Unit would potentially be addressed during this phase by pumping from surface water or groundwater sources. If groundwater sources are required, groundwater would be pumped from wells drilled into the formation, then transported by pipeline to field systems. If surface water sources are used, the water would be pumped from the source and also transported by pipe to in-field irrigation systems. Additional field investigations and testing are necessary; construction actions involved in the potential solutions would be similar to those described in Sections 2.2.2.1 or 2.2.2.2.

2.2.2.2 Rehabilitation and Betterment of CIP Canals and Laterals

Canals are open earth channels used to convey irrigation water from the river or stream source to the farmland requiring water. Canals are typically shaped to meet specific flow conditions. In some

situations, they are lined with clay soil, synthetic membrane, or concrete to reduce water loss through the canal banks due to seepage and to minimize flow irregularities.

A significant portion of the main canal and lateral canal system in the CIP requires substantial rehabilitation due to a lack of maintenance, erosion, seepage, and sedimentation. This includes an estimated 645,586 ft (122 mi) of main canals, 674,110 ft (128 mi) of laterals, 591,982 ft (112 mi) of sublaterals, and 211,374 ft (40 mi) of drains, totaling an area of about 852 acres (Bartlett & West 2014). Additionally, across the system, approximately 535,292 ft (101 mi) of main canals and laterals are recommended for lining or lining repair, amounting to an area of about 385 acres (Bartlett & West 2014). Specific reaches for lining applications would be evaluated in the field.

Remediation efforts for canals include several types of repair work: cleaning and reshaping; canal lining and seepage area remediation; livestock damage repair; overtopping; and bank instability repair. Select canal reaches may also be converted to pipe. During construction on canals, associated access and maintenance roads would also be repaired or in some cases, newly constructed. **Table 2-2** describes the purpose of each type of repair and summarizes the specific construction steps involved in rehabilitation.

Table 2-2: Construction Activities for Canals and Roads

Construction Activity	Purpose of Activity	Specific Activities
Cleaning and Reshaping	Removes water flow restrictions to restore original flow design capacities. Grubbing of vegetation from the canal banks also increases water use efficiency by reducing seepage via roots systems through the banks.	Excess soil, sediment, vegetation, silt/sand bars or other debris would be removed from canal. Canal prism would be restored by excavation or fill. Excavated material would be disposed of onsite or offsite.
Canal Lining and Seepage Area Remediation	Liners reduce seepage, vegetation growth, erosion, and sedimentation, which increases water use efficiency, flow capacity and bank stability.	Canal lining applications involve the placement of either natural or synthetic liner materials. The canal prism would be cleaned, shaped, and compacted, with the liner installed along the select canal reach. Existing liners would be repaired where warranted. For seepage areas, drain inlets, underdrains, or other infrastructure may be installed, as allowable under the scope of work under the Settlement Act.
Livestock Damage Repair/Earthen Ramps	To prevent access and subsequent damage by livestock to canal banks.	Fences may be recommended for installation parallel to canals where warranted. Actual fence construction, however, is not authorized under the scope of work under the Settlement Act. Requires coordination with landowner and the BIA. May be used in conjunction with earthen access/ramp points (which may be constructed during cleaning and reshaping activities).
Overtopping Repair	To prevent overtopping of the canal banks during high flows which could result in a breach of the canal bank,	Sufficient bank height for safe operation of the canal would be added on both left and right embankments

Construction Activity	Purpose of Activity	Specific Activities
	possibly resulting in significant property damage or life endangerment.	along the reach. The downstream check structure would be rehabilitated to allow for greater operational control of the water elevation.
Bank Instability Repair	To repair erosion along the canal invert or banks which can result in significant structure damage or failure.	Invert or banks of canal would be rebuilt. Lining applications may be utilized (see Canal Lining).
Piping of Select Canal Reaches	Piping eliminates open ditches, associated structures, and associated costs for rehabilitating those structures. Piping eliminates seepage and evaporation issues, is less susceptible to livestock damage, is safer for the public, may increase usable acres (e.g., farmable acres), and generally requires less operation and maintenance (e.g., no cleaning and reshaping).	Reach of canal requiring pipe would be cleared of vegetation. Topsoil would be stripped and stockpiled. A trench would be excavated along the entire reach of pipe. Pipe would be installed with appurtenances associated with either a closed or open system as required by site conditions. Compaction, backfill, and final cleanup would occur after pipe is laid in trench. Seeding would be done if warranted.
Access/Maintenance Road Repair/Construction	Provides long-term, all weather, and durable access to operate and maintain CIP system.	Vegetation in the road alignment would be cleared and grubbed. Topsoil would be stripped and stockpiled. Subgrade and surface material would be graded and compacted. Drainage, erosion controls, and seeding would be implemented as warranted.

2.2.2.3 Alternative On-Farm Irrigation Systems

Currently, flood irrigation methods are the most common methods used across the extent of the CIP. Conversion to more efficient irrigation methods could improve water efficiency, resulting in reduced water storage shortages, canal capacity problems, field runoff, and sediment load into waste water. On-farm improvement options include: land leveling; conversion to gated pipe as well as surge irrigation for gated pipe applications; lining of on-farm ditches; and installation of sprinkler irrigation systems, such as center pivots, wheel lines, linear sprinklers, and solid set sprinklers. The specific construction activities involved in converting to each type of method are summarized in **Table 2-3**.

Table 2-3: Construction Activities for On-Farm Irrigation Improvements

Type of Improvement	Purpose and Typical Application	Specific Activities
Land Leveling	Allows for uniform distribution of water across the field surface and decreased erosion.	Earth-moving heavy equipment would be used to re-grade or re-slope the surface material. Appropriate ditches, structures, and drains would be constructed according to the specific layout of the annual crop rotation and irrigation system.

Type of Improvement	Purpose and Typical Application	Specific Activities
Gated Pipe	Transports water within pipes rather than on the soil surface, minimizing potential soil erosion. Pipes apply irrigation water across the head of the field where it travels by gravity down the length of furrows. Used in level fields with consistently sloping topography.	Pipe furrows and waste water canals are typically dug or installed with small machinery. Waste ditches are dug at the terminal (downhill) portion of the field to collect unused irrigation water. Piping and ditches are placed annually depending on the crop rotation.
Surge Irrigation	Applies water at set intervals. Influences wetting and drying cycles, which results in greater irrigation water advance rates across the field. Would be used in fields with gated pipe. Limited by soil type.	Conversion can require the installation of automated structures at the turnout to the field. Minimal surface disturbance would be required to install these structures.
Lining Applications	Decreases loss of water through seepage and infiltration. Used in fields lacking sufficient hydraulic head for gated pipe.	Field ditches would be shaped to specified design geometry. Liner (synthetic or natural) would be installed and anchored at top of ditch banks with minor excavation and backfill.
Center Pivots	Increases water use efficiency compared to flood irrigation. A type of sprinkler system that pipes water to the center of the field, where it is fed into an automated sprinkler which rotates around the field. Applicable for use in fields with slopes not conducive to surface irrigation.	Construction activities involve excavating, placing, and backfilling over water supply lines across the field to be irrigated.
Wheel Lines	Increases water use efficiency compared to flood irrigation. Pipes supply water to a sprinkler system mounted on wheels which moves down the length of the field. Applicable for use in fields with slopes not conducive to surface irrigation.	Supply pipes and wheels lines are surface features only. No excavation is typically required.
Linear Sprinklers	Pipes supply water to a sprinkler system mounted on wheels which move in a set pattern or linear move system. Can be labor intensive to operate, but has a lower capital cost compared to pivot systems.	Installation of a pump at the source canal would require disturbance within the pump footprint. Water pipelines may be installed underground, resulting in soil and possible vegetation disturbance.
Solid Set Sprinklers	Fixed sprinkler locations throughout the field. Ideal for odd-shaped fields with slopes not conducive to surface irrigation.	Underground pipelines would be installed, with pumps installed at the source canal.

2.2.2.4 Crow Tribe Purchase of Presently Assessable (PA) Fee Lands

The nine BIA-owned irrigation units include approximately 47% of PA lands in fee status, totaling 17,910 acres (**Table 2-4**) (BIA 2013). These lands would be evaluated for potential purchase to consolidate tribal service areas. Purchase of these lands would maximize benefits to tribal and allotted lands by making implementation of alternative on-farm irrigation system improvements more feasible. The Tribe may also investigate the purchase of the entire undivided interest in allotted tracts of land, which are

typically fractionated with numerous co-owners. Another consideration for purchase would be TNA lands that could be brought into PA status with minimal improvements.

Land purchasing will involve numerous factors to determine beneficial tracts of land for consolidation into Tribal service areas. Some of these factors include: Tribal input on potential lands they would like to acquire; willing sellers at or near established market value cost; number of sides a parcel is bordered by tribal or allotted land; amount of PA acres in the parcel; potential for TNA lands to be brought back into PA status with minimal improvements; multiple willing sellers in bordering parcels.

Table 2-4: Presently Assessable (PA) Fee Land by Irrigation Unit

Unit	PA Fee Acres
Bighorn	10,639
Agency	1,629
Wyola	1,601
Reno	1,277
Lodge Grass #1	1,292
Lodge Grass #2	414
Soap Creek	546
Forty Mile	265
Pryor	246
Total	**17,910**

Construction actions would not be required for this project phase. Most fee land that would potentially be purchased is currently irrigated and farmed or has been farmed in the past. Transition to tribal ownership would result in no on-the-ground actions. However, in some instances, such as if TNA lands are purchased, or if parcels are consolidated through purchase in order to improve the on-farm irrigation system, then construction actions would proceed as described in Sections 2.2.2.1, 2.2.2.2, and 2.2.2.3 above.

2.2.2.5 Developing Irrigation on Future Trust Lands – Dunmore Bench

Nearly 18,000 acres of the Reservation has been determined feasible for future irrigation development (NRCE 2000). Of this acreage, a 7,000 acre area referred to as the Dunmore Bench has been identified as a focus for potential irrigation development. Within the Dunmore Bench area, an estimated 4,480 acres of land have been identified as fee lands for purchase and 2,640 acres have been identified as land in trust. These lands are located between the Bighorn and Little Bighorn Rivers (**Figure 2-1**).

Design of project facilities for Dunmore Bench has not been completed. The development of the area depends on comprehensive economic and financial analysis, water source evaluation, studies on the suitability of soils for crop production and irrigation, and other design feasibility studies relating to the irrigation system. However, for the purposes of the programmatic EA, several general assumptions can be made in order to analyze the broad range of potential on-the-ground effects of the project.

In general, the overall development process would involve the identification and acquisition of viable acreages, design of the irrigation system, and construction. The proposed water source for the Dunmore Bench is the Bighorn River, utilizing the Tribe's water right from Bighorn Lake or the natural flow right from the Bighorn River. The water would be pumped from either the Bighorn Main Canal or as a new, separate diversion off the Bighorn River. Once water is pumped up to the bench, the design would be, if possible, as a gravity fed system throughout a significant portion of the system with minimal additional pumping. Several other design possibilities would be considered to maximize the efficient use of water, wastewater, and electricity for pumping in the system; however these options are still under consideration and are not evaluated as a part of this EA.

The major construction actions would include: excavations of canals and laterals; construction of reinforced concrete irrigation infrastructure; installation of pumping stations and pipelines; and associated infrastructure requirements including electrical power lines and service roads. Construction activities would generally be similar to those described in Section 2.2.2.1, Rehabilitation and Betterment of CIP Structures (**Table 2-1**) and Section 2.2.2.2, Rehabilitation and Betterment of CIP Canals and Laterals (**Table 2-2**), except that it would be new construction. The scope of this project could include improvements to existing farmland such as land leveling or drainage to make it more suitable for irrigation.

Other on-farm irrigation measures would be incorporated into construction of the system, including gated pipe, surge irrigation, and sprinkler systems, as described in Section 2.2.2.3, Alternative On-Farm Irrigation Systems (**Table 2-3**). Sprinkler irrigation will be the most likely form of irrigation in the Dunmore Bench area, since it is best-suited for areas with steeper topography and uneven slopes. Flood irrigation may also be utilized in areas where fields are sufficiently level, with surge irrigation pursued as an option in conjunction with flood irrigation depending on the soil characteristics.

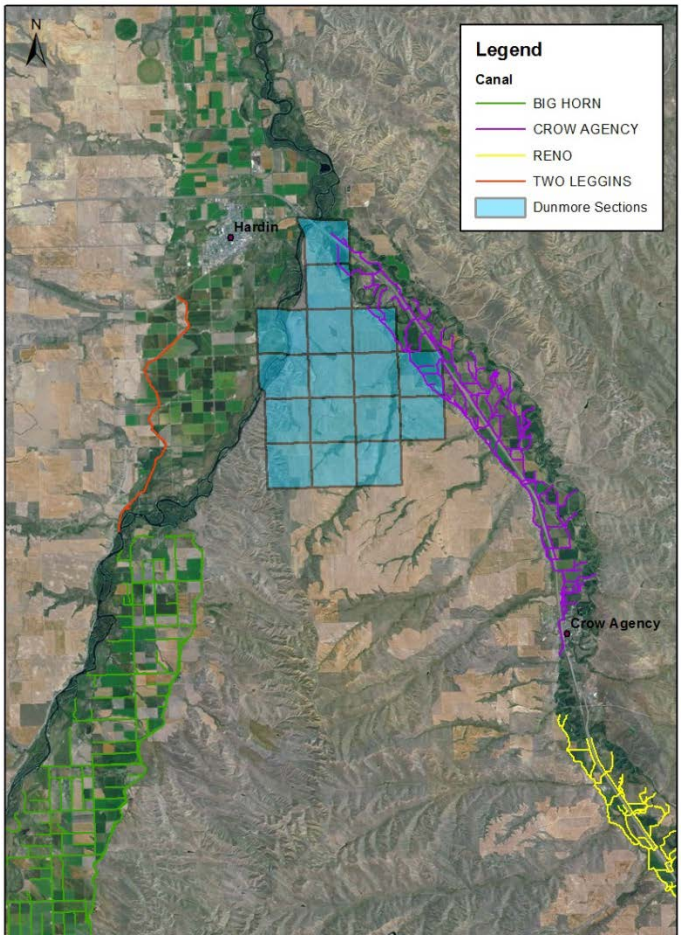

Figure 2-1: Location of the Dunmore Bench Sections of Land

Existing dryland-farmed acreages, or acreages that were farmed in the past, would be targeted for development of the new system to the extent possible. The majority of the infrastructure routes, including new canals and pipelines, would also be within existing or previously farmed acreages, particularly that portion of the infrastructure up on the bench itself. However, portions of the routes would cross some areas that are currently in native or natural vegetation (non-cropland). This would include the route of the pipeline delivering water up to Dunmore Bench, broadly estimated at a length of 5-10 miles and width of construction easement up to 100 ft, as well as up to several miles of main canal at a width of up to 150 ft. Though new farmland acreages would not be directly a part of this project, development of irrigation in this area could result in new production in the future.

2.3 CONSERVATION MEASURES

General conservation measures have been developed to address and minimize the potential environmental impacts of the project. In particular, conservation measures address the key issues

identified by the public and agencies (Section 1.6.2). They include both short-term measures and practices for construction activities and long-term measures that will affect project operations over time or that will prepare the system for potential improved future operation. General conservation measures would be used project-wide for all resources; however, the general measures would be applied with site-specific designs, techniques, or methods, as determined by an Interdisciplinary Team (IDT) review process established for project implementation. The review process and associated agreement is in progress (see Section 2.4).

Conservation measures have been identified for this EA at three levels: measures that are required whenever they are applicable; discretionary measures that would be applied when possible but may not be achievable in every situation; and design alternative measures which are project design options that would be incorporated as required following site-specific IDT review.

2.3.1 Measures Required When Applicable

These measures would be implemented in all situations where they are applicable (determined by IDT review). These measures are assumed to be a part of project actions.

Cultural Resources

- A Class III Cultural Resource Survey would be completed prior to any on-the-ground activities to identify any cultural or historical sites. Existing irrigation facilities would be surveyed; those eligible for inclusion in the National Register of Historic Places (NRHP) would be documented for preservation by a qualified archeologist. Other cultural sites would be avoided by modifying routes or siting if recommended in the Class III survey.
- If cultural resources or burial sites are discovered during construction, work shall immediately be stopped, the site secured, and the Tribal Historic Preservation Office (THPO) would be notified. Work would not resume until there is authorization to proceed.
- Project workers would be prohibited from collecting artifacts or disturbing cultural resources in any area, under any circumstances.

Biological Resources

- Sensitive resources documented during site-specific surveys or determined to be culturally significant by the Crow THPO would be avoided during project siting, design of facilities, and construction activities, unless otherwise permitted or approved.
- Strategies to avoid impacts to migratory birds would be implemented during construction. Typical strategies include timing limitations, removal of nesting habitat, and nesting surveys. In order to reestablish bird habitat as much as practicable following construction, all non-cropland areas impacted by construction would be promptly reclaimed using suitable seed mixes.
- The selected contractor would follow standard avian protection guidelines during construction of project-related powerlines, as described in *Reducing Avian Collisions with Power Lines: State of the Art in 2012* (APLIC 2012) and the USFWS's *Avian Protection Plan Guidelines* (USFWS 2005).
- A site-specific survey would be completed prior to on-the-ground activities within a half-mile radius of the site to identify potential habitat for any federally listed, candidate, or proposed species and within a one mile radius to determine potential habitat and activity status for bald or golden eagles or their nests.
- If bald or golden eagle individuals or active nests are observed within 0.5 mile of project activity, the selected contractor should stop construction and contact the nearest USFWS Office or Office of Law

Enforcement for instructions on how to proceed. Other limitations and recommendations, such as the seasonal restrictions and distance buffers as specified in the *2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan (1994)* (MBEWG 2010), may be applied during construction activities, if such restrictions are deemed necessary during the IDT review.

- The selected contractor would follow Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species* (DiVittorio et al. 2012).
- A noxious weed survey would be completed prior to any on-the-ground activities. Treatment options would be evaluated by the IDT; biological, cultural, and chemical alternatives would be evaluated following Integrated Pest Management techniques. If chemical applications are deemed necessary, all products would be applied according to the Environmental Protection Agency (EPA)-approved product label and any additional site-specific labeling.
- Seeding and mulching would take place where soil has been disturbed outside of the canal prism, in non-cropland areas, as soon as possible following construction. Seedbed preparation would include removal of any noxious weeds or infested topsoil, scarification, removal of stiff clods, lumps, roots, litter, stones, and other foreign material greater than 6 inches from the surface, and filling of rills, gullies and depressions. Seeding would be done by broadcast, drill, or hydroseed methods, based on consultation with the local NRCS. Seed mixes would be native species and may include a cover crop, unless landowner desires otherwise.
- A site-specific wetland delineation would be completed prior to any on-the-ground activities within the construction right-of-way. Inventoried wetlands would be evaluated to determine jurisdiction and which require protection. Permits would be acquired and permit specifications implemented, as appropriate. Any wetlands requiring avoidance would be flagged prior to construction.
- A site-specific pre-construction plant survey would be done within areas of new construction in currently native communities. Populations of rare plants (federally and state recognized species) would be avoided.

Soils/Water/Air Resources

- Stormwater best management practices (BMPs) and spill prevention and containment measures would be implemented for all construction activities for control of water discharge/dewatering, stormwater runoff, sediment discharge, erosion, dust, spills, and pollution. Site-specific Storm Water Pollution Prevention Plans (SWPPP) and Spill Prevention Containment and Countermeasures (SPCC) plans would be prepared and implemented for projects when required by EPA rules and regulations.
- Any temporary water diversions would be returned to natural flow patterns.
- Refueling would occur in designated areas away from waterways to reduce the potential for impacts to natural drainages.
- Temporary and long-term erosion and sediment control structures would be installed as necessary.
- Topsoil will be segregated and stored on-site to be used for reclamation and seedbed preparation.
- When needed, dust control on local roads would be accomplished by applying water during construction. The selected contractor would follow standard construction industry measures to minimize fugitive dust emissions created during construction activities. Any complaints that may arise will be dealt with in a timely and effective manner.
- Equipment exhaust systems would be maintained to factory or better specifications to minimize noise.
- Any new acreage proposed for purchase or on-farm improvements, or proposed conversions from TNA to PA lands, would be reviewed to determine soil suitability for irrigation to minimize potential soil productivity problems caused by irrigation such as water-logging or salinity increases.

Human Health and Safety

- Hazardous materials use, spill prevention, sanitary waste storage, and handling procedures would be planned and implemented as part of general BMPs and site-specific SWPPP and SPCC plans, as required.
- Notifications and coordination with landowners and local residents would be conducted prior to construction to address design options, construction plans, access, and land use operations.
- One-Call would be contacted to locate buried utility lines prior to soil-disturbing activities.
- Contractors would be required to adhere to all local, county, and state regulations and ordinances regarding movement of equipment, oversized or overweight loads, and frost law restrictions.
- Speed limits for construction vehicles and equipment would be enforced to minimize dust, wildlife collisions, and accidents.
- A construction inspector would oversee all construction activities.
- The Tribe would develop and implement a safety plan for all work crews. Visual inspection for factors such as open trench stability, slope stability, confined space, and other potentially hazardous working conditions would be identified according to Occupational Safety & Health Administration (OSHA) regulations. A safety inspector would monitor for implementation of safety and conservation measures.

2.3.2 Discretionary Measures

These measures would be implemented when possible or practicable. Sometimes, other design considerations or requirements will dictate whether these measures can be used. Therefore, they will not be assumed to be a part of the proposed actions.

- Access to project facilities (e.g., staging areas) would be sited or routed to minimize disturbance and fragmentation of natural habitats or sensitive resources, using the most direct routes possible and minimizing areas of soil and vegetation disturbance.
- The use of borrow pits would be limited, using on-site local materials as much as practicable.
- Vehicle and equipment use would be restricted within the construction right-of-way to the extent practicable to minimize soil compaction.
- If warranted, geotechnical investigation could be used to identify bogs or areas where “quick conditions” could exist or develop with construction activity.
- When available and possible, cleared and grubbed woody vegetation would be chipped for use as mulch or stabilizing topsoil stockpiles, rather than hauling it off-site.
- Mitigation plantings of willow species would be considered by IDT review to compensate for willows cleaned out of canals.
- The IDT would identify site-specific options for additional treatment of wastewater during Phase 3, On-Farm Improvements, with respect to farm field runoff and other on-farm overland flows and runoff. Problem areas and possible solutions would be identified, including the use of partnerships for conservation.

2.3.3 Design Alternative Measures

These measures are specific design options for the project, rather than a particular method or practice used. These measures would be considered during the site-specific IDT review process and installed only if the IDT determines they are justified at a specific site. Therefore, they will not be assumed to be a part of the proposed actions.

Alternative 1 – Fish Protection Structures

Alternative 1 would include the construction of fish protection structures at the intersection of certain streams and canals, as well as reservoir outlets. Possible structures include passage structures, such as fish ladders, to allow fish to migrate naturally through stream channels supplying the CIP system, or protection structures, such as screens at headworks, to prevent fish from entering the irrigation system. Construction of these structures would generally be nearby other irrigation structures. Installation of the structures would involve local soil and vegetation disturbance within the structure footprint. Protection of the Bighorn fishery would be the highest priority when determining potential fish structure locations.

Alternative 2 – Wildlife Escape Designs

Alternative 2 would include the incorporation of escape designs or structures in canals to reduce the possibility of drowning wildlife. The focus for adding these measures would be high risk areas with known wildlife crossings and high water flow. Escape designs include deflectors, cleats, ramps, and stepped siphons. Enclosing hazardous sites with effective fencing would also be an option. There may be a combination of features designed into the system depending on local hazards.

2.4 RECOMMENDATIONS FOR PROGRAMMATIC REVIEWS

The following recommendations outline the anticipated process for review and compliance of site-specific work plans tiered to this programmatic analysis and the CIP Master Plan.

1. The Crow Tribe, Reclamation, and BIA should coordinate periodic site-specific environmental and cultural compliance reviews of CIP work. A Memorandum of Agreement (MOA) should be negotiated among the three entities to guide reviews. Programmatic reviews would be documented for consistency with the project decision.

2. During drafting of AFAs and work plans, the three entities should develop a list of work items and activities for preview. A preview would serve to determine the extent of any additional environmental and cultural compliance necessary; and to identify priorities for coordination.

3. Specialists in the environmental and cultural disciplines, preferably those are who are familiar with the project, should be consulted where additional field reviews or surveys are needed. Integrated team reviews would provide for efficiency and consistency in implementing conservation measures.

4. The integrated team or resource specialist should recommend conservation measures using a best fit approach at the site-level. Practical and cost-effective techniques and methods can be tailored to site-specific conditions.

5. Completion of environmental and cultural resource reviews should be documented and coordinated with the final engineering review and close-out (acceptance of work) for individual work items. Reclamation, as the lead agency, should monitor and review conservation measures implemented during rehabilitation.

6. During concurrent reviews of the programmatic EA and CIP Master Plan, on or about every three years, the entities should gather data and organize a written report of the conservation measures incorporated into the project. The record should have utility for future O&M work to conserve natural resources and maintain the integrity of specific features or site conditions that have been rehabilitated.

2.5 NO ACTION ALTERNATIVE

The No Action alternative would be a future scenario in which rehabilitation and improvement to the CIP is not performed. The No Action alternative was implicitly considered during the decision-making process leading up to the Settlement Act. This scenario is presented here for purposes of a very general comparison and would not speculate and evaluate any number of potential future actions taken by the Tribe, irrigators, or anyone else to fix major problems that arise from deterioration, including normal wear and tear, storm damage, and other events.

Under No Action, deterioration of system components would continue to occur over time. By 2035, when the rehabilitation and improvement of CIP work would be completed, conditions of the system under the No Action Alternative, by comparison, would be worse than existing conditions. Existing O&M conducted by the BIA in the future would not be expected to keep up with maintaining existing conditions nor add any improvements.

2.6 SUMMARY OF EFFECTS OF ALTERNATIVES

Table 2-5 summarizes the major effects, both beneficial and adverse, that would potentially occur to key resources as a result of the Proposed Action Alternative compared to the No Action Alternative. Section 3 contains an in depth evaluation and discussion of the potential effects of the Proposed Action, whereas evaluation of the effects of No Action is limited to this comparison summary.

Proposed Action Alternative

The CIP rehabilitation and improvement would have a limited range of environmental effects geographically confined to the Bighorn River, Little Bighorn River, and Pryor Creek systems, primarily where they flow through the Crow Reservation and serve agricultural lands. Many of the project effects on natural resources are generally predictable and would be relatively short in duration. After the majority of the repairs have been completed on the CIP, there would be long-term environmental benefits; in particular, water efficiency would improve because less water would be lost due to leaks and disrepair as in the current condition. Increased water use efficiency would have trickle down positive effects on reducing sedimentation, improving water quality, and benefiting fisheries. Rehabilitation would also allow for improvements to the system's operation; primarily for improved water management and local farming practices.

In the short-term, the use of heavy equipment to excavate and reconstruct irrigation facilities would affect existing soils and vegetation in irrigation canals and ditches and potentially on agricultural lands, depending on implementation of later phases of the project. Affects to streambanks would be limited to work on diversion structures. A year or longer may pass before the sites affected by earth-moving activities are recovered and stabilized to withstand erosion and storm events.

Recommended conservation measures are based on practices developed by land and water management professionals and would be applied to limit these short-term expected effects to natural resources. The programmatic review process is intended to identify pending rehabilitation construction work that might inadvertently cause substantial impacts. A detailed review at the site-specific level would allow time to evaluate current conditions to avert adverse impacts by applying effective site-specific conservation measures.

In summary, if the future programmatic review is implemented consistently across the range of rehabilitation work, no adverse impacts are anticipated under the Proposed Action Alternative.

No Action Alternative

Under No Action, deterioration of the system would continue and lead to compromises in water delivery for irrigation. Resources that would be expected to continually degrade as a result include soils through erosion and sedimentation, water quality and efficiency, fisheries, and related socioeconomic activities of farming and sport fishing. Opportunities would not occur for improved farming practices, coordination of noxious weed control efforts, improved benefits to trust assets, and improved ability to react to changing climate conditions. Existing O&M may lessen the magnitude of some of these effects, but is unlikely to maintain or stop the trend of declining infrastructure conditions.

Table 2-5: Summary of Effects of Proposed and No Action Alternatives

Key or Relevant Resource	Proposed Action Alternative	No Action Alternative
Soils	Irrigation water efficiency results of the project are expected to promote conservation of farmland soils and prevent long-term degradation associated with over-watering, salinization, and excessive runoff and erosion. Soil productivity would be maintained and contribute to farmland viability.	Without improvement work, soils would continue to erode along canals and ditches leading to increased sedimentation and causing issues for the integrity of canals and ditches. Some individual properties may be at risk to localized soil loss and property damage. Furthermore, there would be no project-funded measures to improve soil conservation through irrigation efficiencies or on-farm improvements.
Water Quality	A 20-30% improvement in water system delivery would allow for better control of water applications on farm fields and should lead to changes to irrigation practices that result in long-term benefits to water quality. Runoff and sedimentation levels would decline thereby improving water quality conditions over time. On-farm practices have an important role in Bighorn River water quality and the CIP project presents an opportunity for farmers to take measures to reduce sedimentation.	Protecting existing water quality would be more difficult under No Action due to the lack of maintenance relative to system deterioration. Water quality in all three basins (Bighorn, Little Bighorn, Pryor Creek) would potentially decline because of the system-wide need to repair irrigation infrastructure to adequately maintain or improve water quality.
Water Quantity	Anticipated increase in water use efficiency between 20-30% from rehabilitation alone, with the potential for further gains in efficiency through improved operations. More water would be available for irrigation or the amount of water diverted could be reduced.	Irrigation water use efficiency has declined over time in the system. This trend would be expected to continue to over time. The net difference from existing conditions would likely be greater in the future, meaning the net conditions would become worse. Diversion demands may increase to compensate for this. Lower portions of the units would be expected to have greater adverse impacts.

Key or Relevant Resource	Proposed Action Alternative	No Action Alternative
Wetlands	Natural wetlands would be conserved and would not be measurably affected. However, artificial wetlands may be decreased in size or diminished after leaky canals are fixed. It is estimated that up to 10% (300 acres) of the wetland area is of the artificial variety. Before canals are lined, adjacent wetlands would be evaluated to determine retention values.	Seepage of water from canals and ditches would continue to contribute to and support artificially created wetlands. Those receiving additional water due to increased diversions (increased canal flows) may stay saturated for longer into the season or increase in size. Those located further down the system may experience the same or conversely dry up or decrease in size because of interruptions in flows caused by canal and ditch deterioration. The balance of gain or loss cannot be predicted accurately without actual monitoring over time.
Noxious Weeds	Noxious weeds growing in the project area could infest newly disturbed ground from construction activities. Most local major weeds are associated with agricultural lands, tend to be herbicide resistant, and are persistent. Currently, weed control is conducted by locals on private lands and the BIA along road right-of-ways (ROW). Additional control would be implemented or coordinated with local control where project work could lead to new infestations.	Noxious weeds would likely continue to become established and persist on damaged and eroded sites. Many are agricultural weeds that are relatively persistent on the landscape. There are not likely to be any major differences in the future under No Action, though opportunities for coordinated weed control on CIP units with local residents and the BIA would be forgone.
Fisheries	Water quality from irrigation return flows to the Bighorn River has negatively affected fisheries resources. Long-term benefits to fisheries from this project would include improvements in water quality and potentially reduced water diversion. There are other contributing factors that would not be independently fixed or resolved by the project. While the project does not specify how individual farmers should manage their lands, there are opportunities to improve irrigation practices through grants, loans, and farming assistance. Irrigation efficiencies and on-farm improvements are expected to benefit fisheries resources over current conditions.	The existing condition is identified as a key issue for the project; No Action would likely lead to continued decreases in water quality and undesirable effects for maintaining a valuable fisheries resource. Water quality supporting viable fisheries and economy may be adversely affected due to sedimentation and return flows with farm chemicals and animal waste. Effects would likely be more pronounced in certain events, such as a specific system component failure (e.g., washouts, floods), but over time would trend towards lower water quality.
Socio-economics	Farming and the Bighorn River sport fisheries are important economies relevant to the CIP. A rehabilitated CIP would have benefits to local farmers and, along with potential improved farm practices, would be beneficial to water quality and in turn beneficial for sport fisheries conservation. Because both resources contribute substantially to local economies, there would mutual long-term benefits.	Farming operations and farm viability could be adversely affected without reliable delivery of irrigation water. Users on the far ends of the irrigation units are likely to be more vulnerable. One hundred thirty-one million dollars' worth of project funds would not be expended; benefits associated with construction employment, product/service purchases, and influx of money into local economy would not occur.

Key or Relevant Resource	Proposed Action Alternative	No Action Alternative
Trust Benefits	Rehabilitation and improvement of the CIP, along with later phases of the project such as purchase and development of additional lands, would maintain and increase opportunities for farming on the Reservation. The Master Plan identifies a number of opportunities generated from project priorities directed for the Tribe's benefit. The Bureau of Reclamation and Bureau of Indian Affairs would continue to work with the Tribe in jointly protecting trust assets.	Trust asset values of the CIP would decline with deteriorated conditions over time. Opportunities for benefits to the Tribe and allottees would be diminished and devalued under No Action. Future conditions under No Action may lead to a deteriorated CIP having more of a liability than asset value.
Environ-mental Justice	No adverse or disproportionately negative impacts are anticipated to minority or low income populations. The CIP work is not anticipated to affect hazardous sites or facilities identified within or near the Reservation, nor would any of those sites have an effect on the irrigation system.	Deteriorated conditions of the CIP by 2035 would not lead to an EJ issue. No particular hazards from toxins or contamination from No Action would be a threat to local communities.
Cultural Resources	Rehabilitating and improving the CIP would result in some of the historical structures being removed and replaced. Cultural resources may also be discovered (unearthed) during ground excavations. In the event of discovery the project work would be halted until additional protections and measures are taken.	Under current O&M work performed on the CIP, priorities would be on a case by case basis as the system declines. Under No Action, effects to cultural resources, vegetative communities, wildlife, air quality, paleontological resources, and floodplains would vary at the site-specific level, tend to be subtle, and not cause adverse impacts.
Vegetation	No particular plant communities of concern would be affected by the project. Disturbance to native soils and vegetation adjacent to the CIP would be less than 20% of the project area. While some adverse effects are inevitable with construction work, disturbed sites would be rehabilitated to match the original vegetation types and uses.	
Wildlife	There would be changes to existing wildlife habitats within the footprint of the project area with the excavation and removal of vegetation along canals and waterways. The project may displace wildlife from local habitats when construction work is underway. Most effects would be temporary and not harmful to populations or any species in particular. Drowning hazards to wildlife crossing canals would be assessed and mitigated with safety designs for escape where practicable.	

Key or Relevant Resource	Proposed Action Alternative	No Action Alternative
Air Quality	Dust from equipment excavations and operation on unpaved roads would increase during construction work. Excessive dust would be controlled by using dust abatement practices so that air quality is not impaired. Where work is in close proximity to residences, local residents would be notified in advance so that conflicts might be resolved.	
Paleonto-logical Resources	No concerns for paleontological resources were identified because the presence of fossils and other remains is lacking in the affected area.	
Climate Change	Climate change may alter the hydrological pattern in the Bighorn Basin with a shift towards earlier snow melt and runoff. This could occur during the lifespan of the CIP following reconstruction. The Bighorn River units are less likely to be affected because Yellowtail Reservoir provides storage for water delivery later in the growing season. The Little Bighorn and Pryor drainages, lacking major storage facilities, would be more susceptible to shifts in surface flows used for irrigation. Long-term irrigation efficiencies expected from the project would help to adjust to climate change conditions to a certain extent.	Under the No Action alternative, system improvements would be foregone that might otherwise provide greater flexibility for water users to deal with projected climate change. No Action would put the condition of the CIP at a disadvantage when it comes to improved efficiencies for water delivery that allow for better management options, i.e. delivery schedules. By 2035, the CIP may need to be upgraded with greater needs and expense to respond to needs for water future climate conditions.

3.0 Affected Environment and Environmental Consequences

3.1 INTRODUCTION

This chapter describes each resource that has been identified as a key issue or other relevant concern which would affect or would be affected by the proposed action. The purpose of this chapter is to provide an understanding of the probable environmental consequences by first presenting the existing or baseline condition of each resource and then providing an analysis of the anticipated environmental effects of implementing the proposed action.

Organization of the Chapter

This chapter is organized by issue/resource. Each section begins with a brief introduction that explains how the resource is linked to a key issue or why it is important in relation to the proposed actions. The limits of the physical area analyzed for baseline conditions and effects for each resource are defined (see "Affected/Analysis Area" below). Applicable laws or regulations are then summarized to provide context for classifications or standards discussed. The existing or baseline conditions are described, using quantities and trends when data is available, followed by the potential effects to those conditions resulting from the project. Effects may be direct or indirect, positive (beneficial) or negative (adverse), and long-term (permanent, long-lasting) or short-term (temporary). Measures that would be implemented to reduce, minimize or eliminate impacts (conservation measures) are then discussed under each resource. Cumulative impacts, which result from other past, present, or reasonably foreseeable future actions that are not part of the proposed action, are discussed at the end of each resource section.

The chapter ends with a summary of the environmental consequences of the proposed action and a brief overview of anticipated environmental consequences of the No Action Alternative.

Affected/Analysis Area

The affected area encompasses the communities, land, water, and other aspects of the physical and social environment that may be impacted by the project. The boundaries of the affected area for each resource extend to where effects can be reasonably measured and have meaning for the project proposal. Specifically, two boundaries have been used as the extent of the affected area for the analysis of most resources; these are the project area and Reservation boundaries. They are defined below for reference.

- The ***project area*** is the maximum physical footprint of the project, including all potential phases (refer to **Figure 3-1**). It includes all existing irrigation infrastructure, adjacent right-of-way (maximum 150 foot width centered on any linear routes), temporary and permanent storage and staging yards, all land within the boundaries of each irrigation district, and the proposed area of Dunmore Bench. The project area boundary is the maximum outer limit of any direct, soil-disturbing activities associated with the project. It is pertinent for resources that are fixed features.

- The ***reservation boundary*** is defined as the exterior boundary of the Crow Indian Reservation (refer to **Figure 1-1**). The proposed action would occur within this boundary, and more specifically within the portion of the Reservation in Big Horn County. The reservation boundary provided a local, geo-political boundary for social resources and non-fixed biological resources. Data availability was often based on the reservation boundary.

For each resource, the specific analysis area is defined in the introduction of individual resource discussions.

3.2 SOIL RESOURCES

Public concern regarding soil resources was focused on erosion and sediment discharge from the existing system and its effect on water quality (Key Issue #8, Section 1.6.2). Excavation of soils would occur during construction activities; therefore ensuring proper management and reclamation of disturbed soils is another primary concern. The proposed project may also add to the acreage of land irrigated, which could impact soils by increasing surface salinity or water-logging, which would in turn affect farmland productivity.

The analysis of soils was limited to the maximum area that could potentially be disturbed during new construction and rehabilitation of the existing irrigation system, which has been defined as the project area.

3.2.1 Soil Regulations

The 1981 Farmland Protection Policy Act (FPPA) requires examination of the effects of federally funded projects prior to the acquisition of farmlands classified by the NRCS as Prime, Prime if Irrigated, or Statewide/Locally Important Farmlands. Since this project does not involve the conversion of farmland to non-agricultural use, the FPPA would not be a factor.

3.2.2 Existing Soils of the Project Area

The project area is primarily comprised of four broad soil association units (**Figure 3-1**) (USDA-NRCS 2013). In general, the soils in these broad units are derived from alluvial or colluvial sources and are used for cropland.

The Marias-Havre-Harlem association covers the largest portion of the project area at about 50,300 acres (54% of the project area). This unit extends along the Bighorn River and its confluence with the Little Bighorn River, and includes the irrigation units of Bighorn, Soap Creek, Two Leggins, and Agency (**Figure 3-1**). In general, soils of this area are very deep, well drained clays and loams that formed in the layered alluvium of the floodplain and stream terraces. They tend to be calcareous and can also be saline. Slopes are nearly level with a range from 0 to 15 percent. These soils are mainly used for irrigated and nonirrigated crops.

The Savage-Havre-Frazer-Forelle association covers about 25,000 acres (27% of the project area) along the floodplain of the Little Bighorn and the lower reaches of Lodge Grass Creek. Irrigation units included in this soil association group include Reno, Lodge Grass No. 1, Lodge Grass No. 2, Forty Mile, Bozeman Trail, and Upper Little Horn (**Figure 3-1**). Soil textures are loams, silty clay loams, and sandy loams. They

are deep to very deep, well drained soils that formed in alluvium on alluvial fans, stream terraces, and floodplains. Slopes range from 0 to 30 percent. The soils are used mainly for dryland crops but in some areas, including the project area, they are used for irrigated crops and rangeland.

The portion of Pryor Creek within the project area has an association of Windham-Norbert-Judith-Danvers soils, covering about 4,700 acres (5% of project area) and including the Pryor irrigation unit (**Figure 3-1**). The soils in this association are typically clays or silty to gravelly clay loams. They are generally very deep, well drained soils that formed in alluvium and colluvium derived from various bedrock types such as limestone and shale. These soils are along the transition from stream terraces to alluvial fans to hills and foothills; therefore slopes range from 0 to 85 percent. These soils are mainly used as rangeland on native grassland, though in small areas, such as in the project area, they are used as cropland, both dryland and irrigated.

The Dunmore Bench is an area proposed for potential future irrigation development at the confluence of the Bighorn and Little Bighorn Rivers. This area has an association of Lambeth-Keiser-Hydro-Gilt Edge soils covering 6,400 acres (7% of project area) (**Figure 3-1**). The soils in this group are loams and silt loams. They are very deep, well drained soils on terraces adjacent to uplands or footslopes in valleys. They formed from various parent materials, but mainly colluvial or alluvial sources. Slopes range from nearly level in the range of 0 to 8 percent to sloping up to 70 percent. These soils are used primarily for range on native grassland, though some areas can be used for dryland or irrigated crops.

3.2.3 Direct and Indirect Effects to Soils

Effects to soils would include temporary disturbances during construction and excavation work in previously disturbed areas, as well as potential permanent impacts to native soils in select areas of new construction. Construction-related ground surface disturbances for site-specific projects would occur during a time frame of one growing season at the most. All disturbances would occur within the 93,360 acre project area.

Temporary direct impacts to soils during construction include compaction and disturbance of soil layers. Compaction may occur from the use of heavy equipment within the construction right-of-way, which would extend to a maximum width of 100 feet in linear work areas, or during land-leveling of pasture or farmland (Phases 1, 2, 3, 5). Disturbance of soil horizons would occur with any excavation work, but would be localized under and around irrigation structures and within canal prisms and adjacent banks for Phases 1 and 2. Potential land-leveling and new construction (Phases 3, 5) would involve more extensive areas of disturbance.

Soils exposed after construction activity and potential land-leveling would have increased susceptibility to erosion until vegetation is established. Temporary sediment releases would potentially occur during construction anytime water is available to transport excavated or unstable soils. In particular this could occur during activity within canals or near waterways, such as removal of existing structures within canals, canal cleaning or lining activities, pipe installation, and in areas of new construction (Phases 1, 2, 3, and 5). In the event of a spill, such as those associated with equipment refueling, localized chemical contamination of soils could occur.

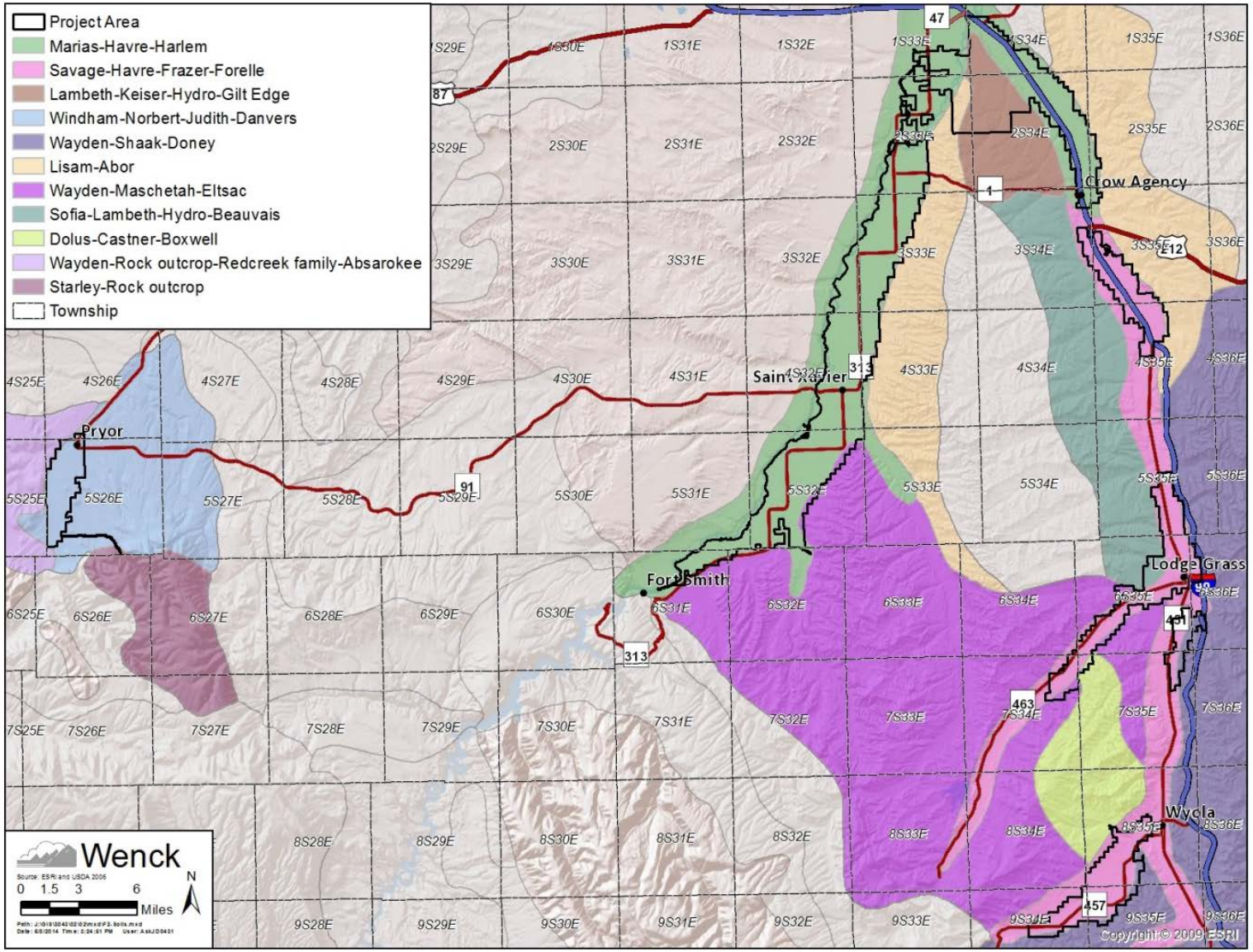

Figure 3-1: Soil Associations of the Project Area

In the long term, sediment release and transport would decrease in the system due to proposed project activities. Most of the rehabilitation work is directed at reducing water velocity, erosion around structures and in canals, and sedimentation. Specifically, erosion would decrease from: repairs to drops, checks, chutes, and wasteways (Phase 1); from all the repair options for canals including lining, seepage repair, bank instability, piping, and road repair (Phase 2); and from potential improvements to flood irrigation including gated pipe, in-field ditch lining, and sprinkler systems (Phase 3). The reduction in sediment load is not quantifiable at this time because of limitations in data, however it is anticipated that there would be a measurable reduction over time from repairs and increased efficiencies that would also measurably contribute to improved water quality (refer to Section 3.3.6 for further discussion).

Permanent disturbance to currently native soils would potentially occur for several project actions. Along most of the existing system, the soils adjacent to structures and canals were disturbed during initial construction of the CIP. However, there would be some instances where native soils would be disturbed, such as where new structures are installed or relocated, where canals are piped through native areas, or in areas adjacent to access roads being repaired or constructed (Phases 1, 2). Potential land-leveling of native pastures associated with on-farm improvements and new irrigation development (Phases 3, 5) would also create permanent changes to native soils; however most land-leveling would occur on land that is currently or previously cultivated and thus where soils have already been disturbed. In sum, an estimated 5-20 percent of the project area has native soils that may be disturbed from project actions.

Localized permanent disturbance to soils would occur when excavated soils are removed and deposited in designated locations from structure relocations, canal cleaning, and in areas of new construction. Borrow sites would potentially be required for fill or backfill material around structures, clay canal liners, subsurface and gravel surface road materials, and in-field ditch lining applications (Phases 1, 2, 3, 5). In most cases, local material would be sufficient and borrow sites would not be necessary; however in some areas they may be required.

Irrigation affects soils in the long-term. The application of water to soil often brings natural salts to the surface, while water-logging and saturation can change soil properties. This can subsequently reduce crop productivity over time. Most of the CIP improvements would improve the efficiency of water use on land already under irrigation, or would involve changing the type of irrigation to a more efficient form (Phases 1, 2, 3). These improvements would reduce water use on specific fields which would reduce the potential for negative effects of irrigation on those soils. Improper management of new development at Dunmore Bench (Phase 5) could create problems on newly irrigated soils, however, since the use of sprinkler systems would be emphasized, this would minimize the potential for these problems compared to flood irrigation.

3.2.4 Conservation Measures

Several measures would be in place to ensure temporary construction impacts to soils would be minimized. BMPs would be implemented for all construction activities, along with site-specific SWPPP and SPCC plans as required, which would include measures and practices for control of water runoff and drainage, sediment discharge, erosion, and prevention of spills. Temporary and long-term erosion and sediment control structures would be installed as necessary according to site-specific needs. Topsoil will be segregated from subsoils and stored on-site to be used for reclamation and seedbed preparation.

Seeding and mulching would occur promptly after construction is complete to minimize the time soils are exposed to erosion. With the use of these measures, no significant or long-term impacts or losses to soils are anticipated for the project.

Long-term impacts to native soils would be minimized by limiting new construction, as practicable, to areas that have previously been disturbed or cultivated. The use of borrow pits would also be limited by using on-site local materials as practicable. New lands brought under irrigation would be reviewed to determine soil suitability for irrigation to minimize potential soil productivity problems in the long term. If soils are suitable, irrigation development would focus on using the most efficient type of system for a particular site to further minimize any long-term problems.

3.2.5 Cumulative Impacts to Soils

Past and present impacts to soils in the project area are primarily related to farming and agriculture. The majority of the project area acreage has been cultivated for crops; thus, the top soil layers have been disturbed and mixed. Agricultural activities, including cultivation and ranching, affect soil properties such as compaction, salinity, and productivity. The disturbance of soils through agricultural activities, particularly flood irrigation of the existing CIP system, has exposed soils to wind and water erosion, displacing them over time and resulting in sedimentation in waterways. Therefore, these past and current activities have contributed to cumulative changes in soil properties and cumulative amounts of sedimentation, affecting the majority of the acreage of soils in the project area.

Aside from this project, there are no foreseeable future actions that would affect large acreages of land within the project area. This project would potentially result in new lands being cultivated or irrigated, both of which would contribute to the cumulative acreage of soils impacted by agricultural activities within the project area, though the majority of new production would be on lands already cultivated. This project would also potentially result in beneficial cumulative effects to soils in the project area. The rehabilitation of the current CIP system and changes in the type of irrigation for large acreages of farmland would potentially reduce the total sediment load entering waterways and measurably improve soil properties, both of which would contribute to cumulative effects to soils.

3.3 WATER RESOURCES & WATER QUALITY

One of the foremost public concerns mentioned is the effect of the existing irrigation system on the water quality of local streams and rivers, particularly the Bighorn River, which has an economically and recreationally important trout fishery (Key Issue #1, Section 1.6.2). Currently, irrigation returns and runoff carrying sediment, chemicals, and livestock waste enter the Bighorn and other rivers. The public desires that additional measures should be taken during rehabilitation and improvement of the system to improve water quality. Another consideration voiced by the public is the effect of irrigation on the amount of water available within local rivers and streams for maintaining instream flow for fisheries and other uses (Key Issue #6, Section 1.6.2).

As an irrigation system, the CIP is directly linked to the water resources upstream and downstream of source rivers. Water is diverted into the CIP, used for irrigation, and excess water is returned downstream. Therefore, the analysis area for water resources includes tributaries or waters upstream that contribute to the source streams of the CIP system. The analysis area also includes reaches downstream, which receive excess water from the system, limited to the first gaging station

downstream of the outlet. Although the system contributes to water quality further downstream, the effect is diluted and difficult to separate from other point or non-point contributions in those reaches.

3.3.1 Water Regulations and Water Quality Standards

The Clean Water Act (CWA) of 1977 (as Amended, 33 U.S.C. Section 1251) sets the basic structure for regulating discharges of pollutants to waters of the United States. The CWA gives the EPA authority to establish water quality standards, control discharges into surface and ground waters, develop waste treatment management plans and practices, and issue permits for discharges (Section 402) and for dredged or fill material (Section 404). The CWA makes it unlawful to discharge any pollutant from a point source into any navigable water of the U.S. without a permit obtained from the National Pollutant Discharge Elimination System (NPDES) program.

The CWA provides for the delegation by EPA of many permitting, administrative, and enforcement aspects of the law to state and tribal governments. The Crow Tribe is in the process of establishing water quality standards and developing a ground water and surface water monitoring plan. Until the EPA adopts such standards, federal water quality regulations are applicable to tribal waters.

For the purposes of this EA, reference to state water quality standards was used, as they are equal to or more stringent than federal standards. The Water Quality Act is the basis for water quality protection in the state of Montana (Title 75, Ch. 5). The Administrative Rules of Montana define water quality standards and require the classification of waters in the state according to beneficial uses each body of water should support, according to Section 303(d) of the CWA. Variations in water use classifications reflect the potential to support cold-water or warm-water fisheries (**Table 3-1**).

Table 3-1: Classifications and Designated Beneficial Uses for Streams, Rivers, and Reservoirs

Rule	Classifications	Beneficial Uses*
17.30.623	B-1	Suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; **growth and propagation of salmonid fishes and associated aquatic life**, waterfowl, and furbearers; and agricultural and industrial water supply.
17.30.624	B-2	Suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; **growth and <u>marginal</u> propagation of salmonid fishes and associated aquatic life**, waterfowl, and furbearers; and agricultural and industrial water supply.
17.30.625	B-3	Suitable for drinking culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; **growth and propagation of <u>non-salmonid</u> fishes and associated aquatic life**, waterfowl, furbearers; and agricultural and industrial water supply.

*Bold text added to emphasize differences (Source: Admin. Rules of Montana).

3.3.2 Water Rights and Instream Flow Requirements

The Tribe has quantified water rights to the natural flow of the Bighorn River for current developed uses and new development within the Reservation of 500,000 acre-feet per year (AFY). In addition to the natural flow, the Tribe is entitled to an allocation of up to 300,000 AFY of water stored in Bighorn Lake, as measured at the outlet works of Yellowtail Dam. Not more than 150,000 AFY of the allocation may be used or diverted as authorized by the Tribe, provided that not more than 50,000 AFY may be used

outside the Reservation. Up to an additional 150,000 AFY may be used by the Tribe in case of a shortage of the Tribe's natural flow right of 500,000 AFY in the Bighorn River. (Settlement Act, Section 408)

A streamflow and lake level management plan (SLLMP) for the Bighorn River and Bighorn Lake became effective as part of the Compact, as developed by the Tribe, the Secretary of the Interior, and the State (Article III, Sect. A.7.). The SLLMP establishes terms and conditions for use of the Tribal Water Right. Pertaining to this project, the Tribe shall permanently dedicate 250,000 AFY of the tribal water right to instream flow of the Bighorn River (SLLMP, Sect. 2.A) and no less than 50 percent of any water salvaged as a result of rehabilitation and betterment of the Bighorn Irrigation Unit (Sect. 2.C).

Important Definitions

Instream Flow: For the SLLMP, the water flowing in the Bighorn River released from Yellowtail Afterbay Dam and maintained throughout the reach to the downstream measuring point to maintain the fisheries resource.

Downstream Measuring Point: The point 600 feet upstream from the Two Leggins dIversion facility.

(Source: SLLMP, Sect. 1)

Reclamation controls releases from Yellowtail Afterbay Dam to the Bighorn River based on a number of factors. One of those factors are the operating criteria defined in the SLLMP to provide instream flow for managing the fishery, as measured at the St. Xavier gaging station. The minimum instream flow is 1,500 cfs (1,085,950 AFY). See Section 3.6.1 for detailed flow targets for fisheries (SLLMP, Sect. 4.C.3). Reclamation is also charged with releasing water in the amount equal to all new development, which would include irrigation development, in the reach that includes the Bighorn Irrigation Unit (SLLMP, Sect. 2.D).

3.3.3 Existing Surface Water and Current Irrigation Use

Irrigation demands for the CIP are supplied by the natural flow from the Bighorn and the Little Bighorn Rivers, Pryor Creek, Lost Creek, Sunday Creek, Soap Creek, and Lodge Grass Creek (**Figure 1-1**). These streams are within three major drainage systems: the Bighorn River, the Little Bighorn River, and Pryor Creek (**Table 3-2; Figure 3-2**). The drainage systems are typically integrated, with surface runoff flowing overland and collecting in major drainages; few depressional water features are present. The general direction of water flow is from southwest to northeast. The Little Bighorn is a major tributary of the Bighorn River, with the confluence at the city of Hardin. The Bighorn River flows north through the Reservation from the Montana-Wyoming state line and empties into the Yellowstone River. Pryor Creek is a smaller perennial river, with many small intermittent tributaries. It flows north directly to the Yellowstone River (**Figure 1-1**). These major drainages are within the Yellowstone River sub-basin of the Missouri River basin (MTDEQ 2014a).

Table 3-2: Hydrologic Units within the Project Area

Major Drainage	Subregion (HUC 8)	Watersheds (HUC 10)
Bighorn River	Lower Bighorn (10080015)	Soap Creek (1008001501)
		Grapevine Creek-Bighorn River (1008001503)
		Rotten Grass Creek (1008001502)
		Two Leggins Creek-Bighorn River (1008001506)
		Whitman Coulee-Bighorn River (1008001507)
Little Bighorn River	Little Bighorn (10080016)	Owl Creek (1008001602)
		Lodge Grass Creek (1008001603)

Major Drainage	Subregion (HUC 8)	Watersheds (HUC 10)
		Middle Little Bighorn River (1008001604)
		Lower Little Bighorn River (1008001605)
		Upper Little Bighorn River (1008001601)
Pryor Creek	Pryor (10070008)	Upper Pryor Creek (1007000801)

Source: MTDEQ 2014a

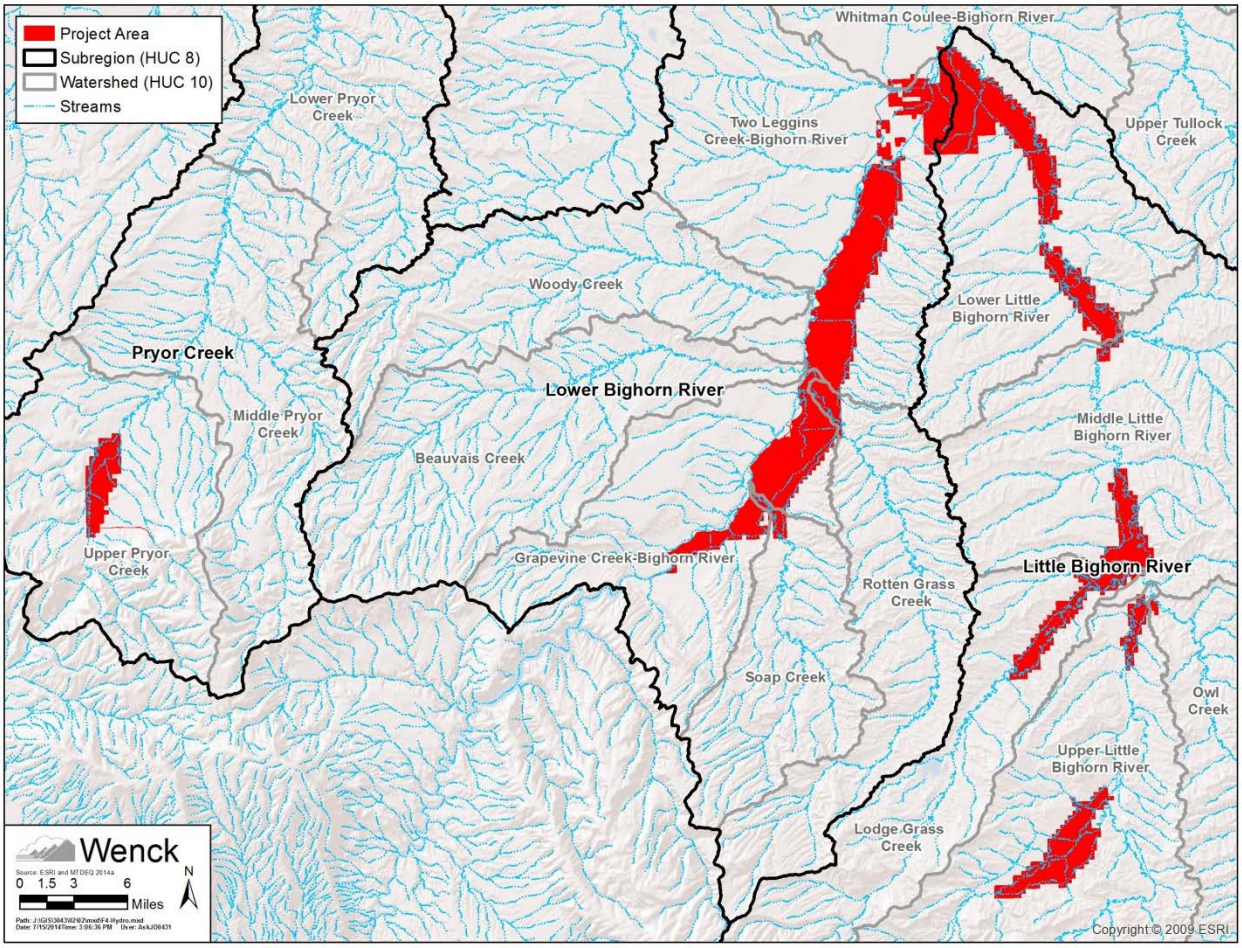

Figure 3-2: Hydrologic Units of the Project Area

Essentially all irrigation is supplied by surface water sources, originating in the Bighorn Mountains (HKM 2007). During the spring runoff period (May and June), diversions of 20,000 to 30,000 acre-feet of runoff are made from the Bighorn River into the CIP through canals and laterals, with an average annual total of 73,900 acre-feet (**Table 3-3**). The natural supply of the Bighorn River and other streams supplying the CIP drop off rapidly during mid-summer when runoff from snow pack and rainfall are depleted. Decreased flow typically occurs near mid-July, but may start as early as mid-June in dry years. July is also the peak period for irrigation use for the CIP (HKM 2007). Therefore, there are typically water shortages for irrigation units on some of the smaller streams from July through September (**Table 3-3**). The Lodge Grass Storage Reservoir provides a supplemental water supply to the natural flow for the two Lodge Grass Units, the Reno Unit, and the Agency Unit, with a capacity of 23,000 acre-feet (HKM 2007).

Table 3-3: Twenty-Year Average Annual Stream Flow and Irrigation Use

Stream	Irrigation Unit	Available Flow from Stream (acre-feet)	Irrigation Diversion (acre-feet)	Flow Surplus (+) or Deficit (-) (acre-feet)
Bighorn River	Bighorn	2,408,000	73,900	2,334,400 (+)
	Two Leggins	---	---	---
Soap Creek	Soap Creek	19,800	7,800	1,600 (-)
Little Bighorn River	Agency	170,800	19,300	151,300 (+)
	Reno	139,300	7,800	131,500 (+)
	Upper Little Horn (Wyola)	99,600	36,900	1,900 (-)
	Bozeman Trail			
	Forty Mile	137,000	8,400	128,600 (+)
Lodge Grass Creek	Lodge Grass #1	32,500	28,700	13,300 (-)
	Lodge Grass #2			
Pryor Creek	Pryor	36,500	14,500	5,400 (-)

Source: HKM 2007, p. 59-62

Irrigation efficiency can be distinguished at several levels beginning at the point where water is diverted into a system, and continuing through conveyance, distribution, farm storage, application, and finally, as water is consumed by a crop to produce yield (Fairweather et al. 2003). Water losses can occur across the system from a variety of factors including: evapotranspiration; seepage; operation; and leakage. Preventing or reducing these losses results in improved efficiency (Fairweather et al. 2003).

The efficiency of the CIP as a whole is unknown because the system is not equipped with water meters; therefore, no water use records are available. However, broad estimates using NRCS indicators and other assumptions indicate efficiency to farm turnouts is below 50%, possibly as low as 30% (HKM 2007). In other words, the majority of the water is lost through the water conveyance and distribution system before it even reaches the farm field, accentuating the need for improvements to the CIP.

3.3.4 Existing Groundwater

Both deep and surficial water-bearing geological formations are present in the project area (Moulder et al. 1960, Wheaton & Lopez 1999). The surficial formations are typically derived from alluvial sediments, and not connected to deeper groundwater formations due to impermeable geological strata. Surficial groundwater formations are associated with stream systems, and typically do not penetrate deeper than 40 feet from the surface. Lost Creek, a tributary to Pryor Creek, contains reaches where water flows underground, reemerging downstream (Wheaton & Lopez 1999). The CIP Lost Creek Diversion and associated canal are located above this phenomenon but do not appear to influence flow rates at the point of diversion (Bartlett & West, unpublished observations).

3.3.5 Existing Water Quality

Water Quality Classifications

For the primary surface waters in the project area, state water designations (as defined in Section 3.3.1, **Table 3-1**) are as follows:

- B-1 (supports cold-water fishery): Pryor Creek, Little Bighorn River above Lodge Grass Creek, Bighorn River above Williams Creek
- B-2 (marginal support of cold-water fishery): Bighorn River Mainstem from Williams Coulee to Yellowstone River; Little Bighorn Below Lodge Grass Creek (Admin. Rules of Montana, 17.30.611).

The Bighorn River south of St. Xavier is the only water feature within the project area listed by the state as impaired for not meeting standards for water quality (MTDEQ 303(d) list 2014; MTDEQ 2014b). The probable case of impairment is contamination by lead and mercury; it is also listed for exceeding allowable Total Nitrogen concentrations.

General Water Quality of Affected Stream Systems

Major influences on the water quality of streams for the area are geology, land use, runoff, groundwater discharge from agricultural areas, and drought (Peterson et al. 2004). Foremost concerns are high concentrations of nutrients, chemicals, and sediment and their effect on aquatic life.

Compared to the Yellowstone River basin as a whole, the Bighorn River has a higher median concentration of dissolved solids, higher nitrate concentrations, and degraded periphyton and invertebrate communities. As such, the water quality of the Yellowstone River is degraded after its confluence with the Bighorn River. Coliform bacteria concentrations also frequently exceed federal guidelines in the Bighorn River, with noticeably higher concentrations around agricultural operations within the watershed and increases during months of irrigation, most likely due to flood irrigation practices (Peterson et al. 2004).
Pesticides and other chemicals are often detected from water quality samples taken in the Bighorn River. The most frequently detected pesticide analyzed was Atrazine, which is a highly mobile pesticide and heavily used in the basin. Pesticides are more prevalent within the streams during the months between May-September. Additionally, pesticides were detected within the groundwater resources sampled in the basin (Peterson et al. 2004).

Bighorn River Drainage –20,700 square miles, ranging in altitude from 2,900 to 13,800 feet. The river system includes two major reservoir systems, Boysen Reservoir and Bighorn Reservoir, which have significant impacts on the basin hydrology which in turn greatly impacts downstream water quality characteristics.

Little Bighorn River Drainage –1,300 square miles, ranging in altitude from 2,900 to 9,800 feet. No major impoundments exist on this river; as such, sediment loading and basin hydrology vary significantly along its course compared to that of the Bighorn River.

Pryor Creek Drainage - 600 square miles, ranging in altitude from 3,000 to 8,800 feet. Given the comparatively smaller size of this drainage, water quality impacts could be more acute.

Project-Specific Water Quality Baseline

One of the key issues identified for the project is the effect of the irrigation system on the water quality of local streams (Section 1.6.2). The flood irrigation practices being utilized in the area cause excess water to be applied to the irrigated lands. In effect, the excess water carries with it pesticides, herbicides, insecticides, and sediment. These constituents have an impact on the quality of receiving waters, most notably measured by Total Dissolved Solids (TDS). Water diverted for irrigation influences water temperature by resulting in temperature increases, which is an important parameter for biological life in B-1 and B-2 classified systems that support coldwater fisheries. Many of the conveyance canals

and laterals within the irrigation systems exhibit significant seepage which also has negative impacts to the basin streams, particularly in regards to transport of TDS into receiving streams.
Current water quality was assessed along each of the major drainages within the project area (Bighorn River, Little Bighorn River, Pryor Creek) to establish baseline measures of the existing system. Metrics used in this assessment were electrical conductivity (EC) (as a measure of TDS) and water temperature, both of which are useful general measures of water quality and which are sensitive to changes in discharge or pollution (refer to project record for further details). Historical monthly averages of these indicators were obtained from U.S. Geological Survey (USGS) gauging stations in each stream to understand seasonal variation. Additionally, for each stream, annual averages from one station upstream and one station downstream of CIP irrigation units were compared.

The Little Bighorn River and Pryor Creek appear to have a typical water quality regime for the project area, in which EC is higher downstream, as the streams pick up naturally erodible soils as well as wastewater return and seepage from irrigation (**Figure 3-3**). However the Bighorn River does not show this clear pattern. Instead, EC is similar upstream and downstream. This difference may be because the majority of the sediments within the mainstem of the Bighorn River are captured in Bighorn Reservoir, upstream of the project area.

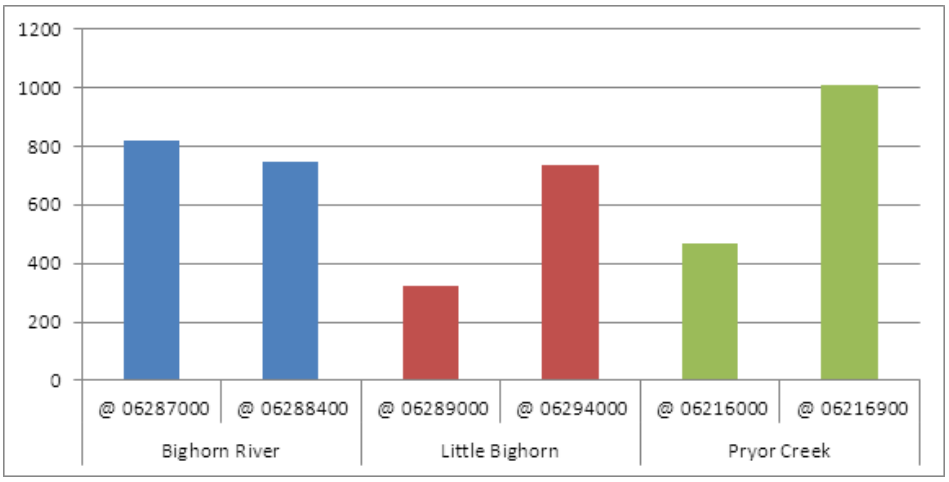

Figure 3-3: Baseline electrical conductivity measurements in microSiemens/cm upstream (left bar) and downstream (right bar) of project area for all three major drainages.

For all three streams, temperature records have a similar pattern, with higher temperatures downstream (**Figure 3-4**). The Little Bighorn River shows a more extreme difference in temperature upstream versus downstream, whereas the Bighorn River and Pryor Creek are only slightly higher on average over the year.

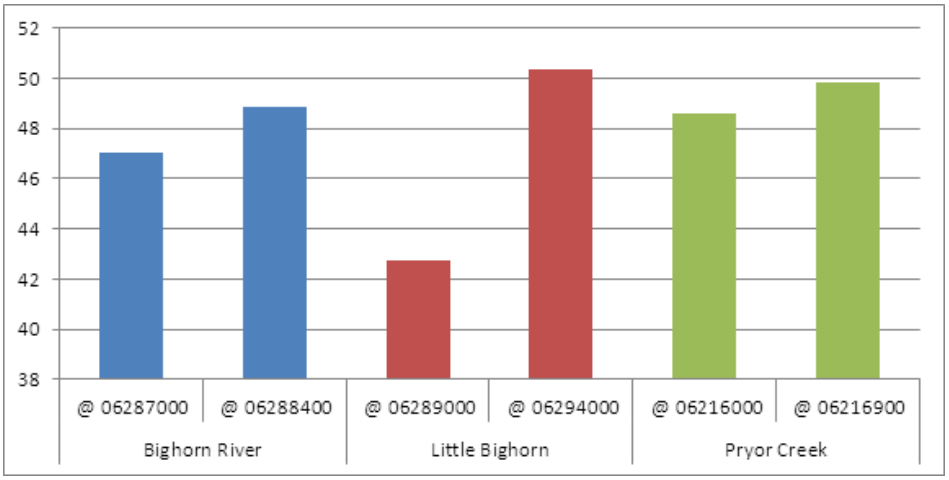

Figure 3-4: Baseline temperature measurements in degrees Fahrenheit upstream (left bar) and downstream (right bar) of project area for all three major drainages.

Water temperature upstream and downstream for the three drainages was affected most by two variables, flow rate and air temperature, which can be better understood by looking at seasonal variation (Project Record, Water Quality Analyses). For the Little Bighorn River, during winter months, the water temperature decreases as it approaches its confluence with the Bighorn River (**Figure 3-5**). This is due to air temperatures cooling the water or groundwater inputs. During the summer months, the water temperature increases as the Little Bighorn River approaches its confluence with the Bighorn, with the biggest increase in July. This is due to warm summer air temperatures and to water being drawn for irrigation and warmer wastewater returns. A similar seasonal pattern in water temperature was apparent for the Bighorn River and Pryor Creek (Project Record, Water Quality Analyses).

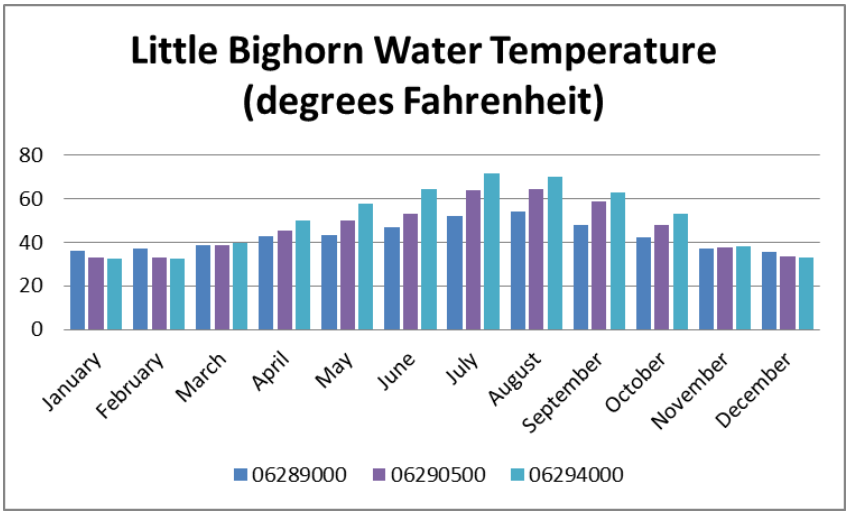

Figure 3-5: Baseline monthly average temperature measurements on the Little Bighorn River from three USGS gauging stations, from upstream (left bar) to downstream (right bar) of project area.

3.3.6 Direct and Indirect Effects to Water Resources

Temporary Effects

Construction of the proposed project would result in temporary effects to water resources. Repair of existing CIP structures, canals, or ditches (Phases 1, 2, 3) or construction of new facilities (Phase 5) would require a dry working surface. This would require temporary diversion of surface waters and dewatering of surficial groundwater. When construction is complete, diverted water would be returned to natural flow patterns, with no long-term significant impacts to surface or groundwater resources.

Work within natural drainage systems in the project area would conform to all applicable regulations. Disturbance of soils and vegetation during construction would increase the potential for sediment to enter natural waterways. Spills occurring during refueling of construction vehicles have the potential to add chemical contamination to waterways. These impacts would be localized in and around structures and within the canal prism during project activities.

Water Quantity and Quality

Improving the efficiency of the existing irrigation system is one of the main purposes of the proposed project (Section 1.3). The current system-wide efficiency to farm headgates is estimated to be as low as 30% (HKM 2007). Several project actions would contribute to increased efficiency within the system, including repaired structures, repaired functions of structures (Phase 1), grubbing of vegetation and lining of certain reaches of canals (Phase 2), in-field lining of ditches, and installing surge irrigation or sprinkler systems (Phase 3). Assuming operations of the CIP do not change, the rehabilitation actions alone (Phases 1 and 2) would increase system-wide efficiency by an estimated 20-30 percent up to farm turnouts, with the possibility of further efficiency through on-farm improvements by reducing water losses during farm storage and application (Phase 3) (Bartlett & West 2014). The time frame of the long-term beneficial effects of improved efficiency would be within a 20-50 year period, assuming all repairs are maintained during that time.

Improved system-wide efficiency would potentially result in reduced water use. For example, if the average amount of water diverted on the Bighorn drainage (including Bighorn and Soap Creek Units) is 81,700 AFY, at the current estimated efficiency 24,510 AFY is available at farm turnouts for crop production (**Table 3-4**). If efficiency is increased by 20-30%, then 40,850-49,020 AFY would be available at farm turnouts for that unit (**Table 3-4**). Several scenarios would be possible: 1) on average, the extra water could be used to compensate for irrigation water deficits (Section 3.3.3); 2) the extra water could be used to irrigate more land within the unit; or 3) the amount of water diverted into the system could be reduced (assuming this adjustment would be made during operations), leaving the additional 16,340 to 24,510 AFY available for in-stream flow within the Bighorn River. On-farm improvements would improve system efficiency and reduce water needs even further.

Table 3-4: Potential Gains in Irrigation Efficiency in Terms of Water Amount

Drainage System	Average Available Flow from Streams (AFY)	Average Irrigation Diversion (AFY)	Water Delivered to Farm Turnouts (AFY)		
			Current	After Rehabilitation	
			30% Efficiency	50% Efficiency (Low Estimate)	60% Efficiency (High Estimate)
Bighorn	2,427,800	81,700	24,510	40,850	49,020
Little Bighorn	579,200	101,100	30,330	50,550	60,660
Pryor	36,500	14,500	4,350	7,250	8,700

The project would contribute to improved water quality in several ways. Reduced system-wide water diversion, or more efficient use of water per acre of land, would reduce excess water going through system canals and ditches and would reduce the amount of water runoff from farm fields. Ultimately, this would reduce the amount of irrigation water returns to source streams. In turn, the amount of associated chemicals, nutrients (excess nitrogen), and sediments from farm fields or canals that are carried in irrigation water returns would be reduced, leading to improvements in water quality in currently impaired source streams and protecting other streams from possible future impairment.

Sediment loads would also be reduced directly by other system repairs (Section 3.2.3) and any potential fencing out of livestock would further reduce sediments and nutrients going into return waters.

Because of limited data, the anticipated improvements to water quality are not quantifiable at this time. However, since a 20-30% increase in system efficiency would result in measurable differences in the quantity of water going through the system, it is expected corresponding measurable differences in irrigation return water quality would result. The proposed project does not contribute to lead and mercury levels in streams in the project area and therefore would have would have no effect on impairment due to these contaminants.

Current water quality measures show that electrical conductivity and temperature generally increase from upstream to downstream (Section 3.3.5). Although there are many factors that influence these measures, the irrigation system contributes in part to these water quality differences. If efficiency improvements are realized and irrigation returns are reduced or improved in quality, this would contribute to less of a disparity between upstream and downstream electrical conductivity and temperature measurements. This would be expected particularly for the Little Bighorn River and Pryor Creek. On the Bighorn River, water quality differences would be less obvious due to the influence of Yellowtail Dam.

New Development

Under Phases 4 and 5, new lands would be brought into the CIP system, resulting in more irrigated acres. There are currently 38,061 PA acres within the CIP system, and 7,841 acres that are TNA, some of which have potential to be irrigated and assessed with minor rehabilitation (Bartlett & West 2014). In addition, there could be 7,000 acres brought into the system through development of Dunmore Bench (Phase 5). If all potential areas are brought into the system, a total of 14,841 acres would be added for a total of 52,902 acres, an increase of approximately 30%.

Additional water may not need to be diverted to irrigate new lands brought into the CIP. Gains in efficiency from project actions (Phases 1-3) would result in more water available within the system to deliver to added lands (**Table 3-4**). However, if more water is needed beyond the amount gained through improved efficiency, additional water would need to be diverted. This would result in reduced in-stream flow for the source stream, unless additional water is released from Yellowtail Dam to compensate for the new development.

New irrigation development would potentially contribute to factors which could reduce water quality. More land irrigated would result in more opportunities for chemicals, excess nutrients, and sediments from farm fields or canals to be carried in irrigation returns. However, new development would utilize efficient on-farm systems and would first draw from excess water available within the system, which may outweigh these potential reductions in water quality. Thus, it is unclear if contributions from added acreages would measurably affect water quality.

Another potential result of new development would be changes in surface hydrology due to land leveling of new farmland under Phases 3 and 5. This would result in long-term changes to surface drainage patterns. However, land leveling would occur on relatively level farmland or pastureland, not steep slopes, so changes would be minor and limited to the farmed area.

Groundwater

Surficial aquifers in the project area are often hydrologically connected to stream systems and surface waters because of their shallow depth and water movement through alluvial sediments. Currently, leaks in the CIP system and surface irrigation provide recharge to surficial aquifers, though the amount and extent of this recharge has not been quantified. Repair of leaks and improved on-farm efficiency within the CIP system could thus decrease the amount of recharge to surficial aquifers. Since the aquifers are also connected to the stream systems, where irrigation returns flow, it is unlikely there would be a measureable change in the drainage system as a whole, though there could be noticeable local effects.

Deep groundwater aquifers are not known to be affected by the CIP system, since the CIP draws from surface waters with no connection to the deeper aquifers or their recharge areas. However, one possibility for the project is that groundwater sources may be used to supply the Pryor Unit of the CIP due to unreliable surface water flows (Section 2.3.2.1). If this were to occur, approximately 14,500 acre-feet/year of water would be drawn from a deep groundwater formation to supply average irrigation needs. Sources for groundwater have not yet been identified.

3.3.7 Conservation Measures for Water Resources

Conservation measures would be applied during construction to limit potential impacts to water resources. BMPs would be implemented for all construction activities, along with site-specific SWPPP and SPCC plans as required, to control water discharge/dewatering, stormwater runoff, sediment discharge, erosion, and spills. Temporary and long-term erosion and sediment control structures would be installed as necessary. Refueling would occur in designated areas away from waterways to reduce the potential for impacts to natural drainages. Diverted water would be returned to natural flow patterns and all work would follow applicable permits and regulations. With the use of these measures, no long-term impacts to surface or groundwater resources are anticipated for the project.

If it is determined that a groundwater source is required to supply the Pryor Irrigation Unit, a thorough evaluation of potential sources would be done. For each potential source, the quantity of water and recharge rates would be identified to determine a sustainable extraction rate for irrigation use. No groundwater source would be used if it would not supply a sustainable, long-term water source. Therefore, this would ensure no long-term impacts to groundwater aquifers would occur.

3.3.8 Cumulative Effects to Water Resources

Past and present impacts to the watersheds of the project area center on the quantity, flow, and quality of surface waters. The natural flow of rivers and streams within the project area are interrupted by diversion into the existing CIP and other private irrigation systems, which cumulatively reduce the quantity of water available for instream flow. In the case of the Bighorn River, the water is impounded by the Yellowtail Dam and release is strictly controlled, affecting natural flow regimes. Many factors have cumulatively contributed to the currently poor water quality in streams of the project area, including natural geology, runoff and irrigation returns from agricultural land, and sedimentation (Section 3.3.3). Two foreseeable future projects in the project area would affect water resources, but neither are anticipated to affect or be affected by the CIP. A planned municipal, rural, and industrial (MR&I) water system would potentially draw an estimated less than one percent of the current water

flow from the Bighorn River. A proposed flood mitigation and restoration project on a four-mile segment of the Little Bighorn River would better protect the town of Crow Agency from flooding.

The proposed action would incrementally contribute to beneficial impacts to surface water flow and quality within the project area. Project actions are expected to result in improved system-wide efficiency in water delivery. More water would be delivered to farm turnouts, with the opportunity to either reduce the amount of water diverted or to irrigate more land, with less excess water returned to source streams. The proposed project would include construction of flow measurement structures or designing structures to be retrofitted in the future. This would prepare the system for the possibility of even further improved water use efficiency if measurement devices were installed and automated flow technology implemented during operations. The potential cumulative effect of these efficiencies would be less water diverted, providing more water to maintain in-stream flows, and reduced irrigation return water, with associated improvements in water quality in source streams. Therefore, there would be a measureable, beneficial cumulative impact to source streams and the watershed as a whole as a result of the proposed project.

3.4 WETLANDS

Wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Register 1980). Over time, the unintentional seeping of water from CIP irrigation ditches has caused the development of wetlands in adjacent low areas. Reducing or eliminating seepage through cleaning or lining of ditches as part of the proposed project may eliminate those wetlands. The public considers these existing created wetlands valuable for filtering irrigation wastewater. In addition, wetlands are regulated at several levels of government. Thus potential wetland impacts are a key issue for the project (Key Issue #7, Section 1.6.2).

The analysis area for wetlands extends to the project area boundary. Wetlands are relatively fixed features, so impacts to them are typically direct or through direct hydrological connections. Therefore, wetlands beyond the project area boundary would not be measurably affected by project actions.

3.4.1 Wetland Regulation and Jurisdiction

Wetlands are federally regulated by the CWA and Executive Order (EO) 11990, Protection of Wetlands 1977. Unless a permit is obtained, the CWA makes it unlawful to discharge any pollutant (including dredge or fill) into navigable water, which includes some types of wetlands. The U.S. Army Corp of Engineers (USACE) administers the Section 404 permit application process. Under EO 11990, each federal agency must minimize the destruction, loss, or degradation of wetlands, and preserve and enhance the natural and beneficial values of wetlands. Each agency must avoid wetland impacts unless there is no practical construction alternative or the proposed action includes all practical measures to minimize harm to wetlands, which can include creation or restoration to mitigate impacts. Federal regulations for surface waters and water quality may also include regulation of certain types of wetlands, as described in Section 3.3.1.

States and tribes can approve, condition, or deny federal permits under Section 401 of the CWA that may result in a discharge to State or Tribal waters, including wetlands. This stipulation allows states and tribes to ensure that a federal permit would comply with their own water quality standards and that the

activity would not violate effluent limitations, new source performance standards, toxic pollutants, and other water resource requirements of state/tribal law or regulation. The Section 401 review allows for better consideration of state or tribal specific concerns (MTDEQ 2010).

Wetlands are also federally protected through Wetland Conservation Provisions of the 1985 Food Security Act, administered by the USDA-NRCS. If a commodity crop will be seeded where a wetland currently is, and if a landowner currently receives or intends to receive USDA benefits at any time in the future as part of enrollment in USDA programs, then the landowner should request a wetland determination through their local USDA service center. If a wetland were dredged or filled for the purpose of producing a commodity crop, USDA program benefits could be denied or revoked according to this law (Joel LaLiberty, USDA-NRCS, Hardin, MT, pers. comm.).

3.4.2 Existing Created and Natural Wetlands

Wetlands within the project area can be categorized into two broad types: artificial and natural. Artificial wetlands are created by human activities. Artificial wetlands within the project area include those that have formed within irrigation ditches and those adjacent to or associated with the ditches formed by seepage from the ditch system. Natural wetlands within the project area include isolated wetland basins and riverine wetlands along the fringes of streams and rivers.

National Wetland Inventory (NWI) maps developed by the USFWS identify nearly 1,300 individual wetlands within the project area totaling over 3,000 acres (**Table 3-5**). This mapping, while not of sufficient resolution for wetland permitting or design criteria, provides information on potential wetland functional types and classifies the wetlands using a hierarchical system based on hydrologic, geomorphic, chemical, or biological factors (Cowardin et al. 1979).

Table 3-5: Wetland Types and Total Acreage within the Crow Irrigation Project

Wetland Type and Sub-Type	Number	Total Area (acres)
Palustrine		
Freshwater Emergent Wetland	738	1,431
Freshwater Forested/Shrub Wetland	103	132
Freshwater Pond	156	168
Riverine	293	1,409
Totals	**1,290**	**3,140**

Source: USFWS 2014

Palustrine wetlands are the most widespread in the project area, covering at least 1,730 acres within the project boundary (**Table 3-5**); they include the created seepage wetlands and natural isolated wetland basins. Palustrine wetlands are vegetated and are frequently referred to as marsh, swamp, pothole, etc. The natural palustrine wetlands in the project area primarily occupy relict oxbows of the main streams or are adjacent to the current stream courses. The created palustrine wetlands adjacent to or associated with irrigation ditches comprise as much as 10% of the total wetland acreage (see Project Record, Wetland Analysis).

Riverine wetlands occupy the main stream channels throughout the project area, numbering nearly 300 individual segments covering over 1,400 acres (**Table 3-5**). Riverine wetlands are natural wetlands

associated with conduits that at least periodically convey running water; they do not include the adjacent areas dominated by trees, shrubs, persistent emergents or mosses.

3.4.3 Direct and Indirect Effects on Wetlands

Direct impacts to wetlands would occur during, or as a result of, construction activities. Indirect impacts would occur if construction activities spread noxious weeds, increase sediment discharge, or otherwise impact water quality; these topics are discussed in Section 3.5.3, Noxious Weeds and Section 3.3.6, Water Quality.

Direct and indirect effects to wetlands within the project area would depend mainly on the type of wetland. Artificial wetlands within and adjacent to irrigation ditches would be directly affected by construction actions. Natural wetland basins would only be impacted if new farmland was converted or improved. Natural riverine wetlands would not be measurably affected by project actions.

The rehabilitation or replacement of existing CIP structures and canals (Phases 1 and 2) and the potential lining of in-field ditches associated with Phase 3 would disturb and remove the vegetation and soils of artificial wetlands within irrigation ditches through excavation and backfilling activities. Disturbance would be localized surrounding structures and within the canal prism and would be short-term, lasting about one growing season for each structure or canal reach repaired.

Rehabilitation work would also result in long-term impacts to artificial wetlands in the irrigation ditches. Repair of some structures (Phase 1) could change hydrologic conditions (i.e. water levels) in the canals that could limit wetland vegetation growth. Canal cleaning, lining, or converting to pipe (Phase 2) would remove vegetation, increase soil compaction, create impervious surfaces such as concrete or lining materials, or change the availability of water within certain canal reaches. Water use efficiencies caused by the project, including on-farm improvements (Phases 1-3) could also reduce water availability within the canals, changing conditions such that wetlands would not form again. On the other hand, new irrigation ditch construction as a part of the Dunmore Bench (Phase 5) would potentially create new irrigation canal wetlands. Wetlands that have formed within irrigation canals do not fall under the jurisdiction of the USACE and impacts to them are exempt from federal permits (USACE 2014). No tribal regulations pertain to artificial wetlands created within irrigation canals. Thus mitigation for permanent impacts to these wetlands is not required for the project, but still may be desirable to avoid adverse impacts and to retain ecological value.

The other type of artificial wetland in this system are those created from inadvertent seepage from the lining of irrigation canals. These wetlands form adjacent to the system, but are hydrologically connected to the water flow within the canals. The lining of select canal reaches, seepage repairs, or converting to pipe associated with Phase 2 and the lining of in-field ditches or converting to pipe associated with Phase 3 would likely permanently cut off hydrology to adjacent artificial wetlands, which would in the long-term reduce the size or eliminate these wetlands. The acreage of these wetlands in the project area could amount to as much as 300 of the total 3,140 wetland acres (as estimated from NWI maps, see Project Record, Wetland Analysis). Wetlands adjacent to the irrigation system that are surficially connected by natural drainage (not by the irrigation canal) to jurisdictional waters (i.e., perennial streams and rivers) fall under the jurisdiction of the USACE under Section 404 of the CWA (USACE 2014). Any seepage wetlands not connected to jurisdictional waters would be exempt from USACE authority (USACE 2014).

Leveling of existing or new farmland (Phase 3 and 5) would remove or disturb soils and vegetation which may include natural wetland basins on the landscape that have no direct hydrological connections to the irrigation system. This could result in fill or removal of wetland acreage. Most of the natural wetland basins in the project area are associated with oxbows and are not within potential new farmland areas; however, up to an estimated 50-100 wetland acres could be within Dunmore Bench and other potential new farmland (as estimated from NWI maps; see Project Record, Wetland Analysis). These wetlands may be under USACE jurisdiction.

Impacts to natural riverine wetlands are not anticipated as a result of the proposed project. Construction activities would occur within the existing CIP system limits. If construction is proposed within river channels (e.g., for construction or replacement of headworks/diversion dams), disturbance would be temporary and localized, limited to soil and vegetation disturbance immediately surrounding the structures. Long-term impacts, such as decreased water flow downstream of the irrigation diversion, would not occur at a sufficient magnitude to affect riverine wetlands.

3.4.4 Conservation Measures

Potential wetland impacts are required to be considered as part of the CWA Section 404 permitting process and EO 11990. As part of the proposed project actions, conservation measures for wetlands would include avoidance, minimization of impacts, and compensation.

A site-specific wetland delineation study would be completed prior to on-the-ground activities and if possible, during the planning and design phase. A certified wetland scientist would delineate, classify, and assess all areas exhibiting general wetland characteristics within the construction right-of-way, in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)* (USACE 2010) and *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979).

Using the results of each site-specific wetland delineation survey, wetlands would be avoided where practicable, adjusting routes and plans. To minimize disturbance where wetlands cannot be avoided, all construction activities would follow BMPs for all construction activities, along with a site-specific SWPPP as required, to control water discharge, runoff, erosion, and sediment discharge. The work would generally be timed when no water is present in the canals. For wetland acreages where avoidance or minimization efforts would not be sufficient to prevent loss of wetlands, compensation measures would be used to ensure no net loss of wetland acreage, including the restoration or creation of mitigation wetlands. All mitigation measures for jurisdictional wetlands would be approved and permitted by the USACE. However, all wetland impacts, whether jurisdictional or not, would be addressed through these measures. Therefore, with these measures in place, minimal impacts to wetlands acreages would result from the proposed project actions.

3.4.5 Cumulative Effects on Wetlands

The project would have minimal impacts to wetland acreages with implementation of avoidance and mitigation measures. Thus, the project would not measurably contribute to cumulative effects on wetlands from other past, present, and reasonably foreseeable future actions.

3.5 NOXIOUS OR INVASIVE SPECIES

Invasive species typically have adverse ecological or economic impacts and often require special measures to control their spread. Exposed soils from ground disturbance activities are a prerequisite for many noxious weeds or invasive plants, which can readily spread by seed or vegetatively into open areas. Since this project would involve soil disturbance, noxious weeds have been identified as a key issue (Key Issue #9, Section 1.6.2). Though not considered a key issue, aquatic invasive species may also be a concern since the project involves surface water resources.

The focus of the invasive species analysis was at both the county and project area level. Though invasive species can spread from or to the project area from surrounding counties, the most immediate area of concern would be within Bighorn County.

3.5.1 Invasive Species Regulations

The National Invasive Species Act (NISA) was enacted in 1996 to coordinate efforts to prevent the spread of aquatic nuisance species and to regulate ballast water. It also authorized funding for research on aquatic nuisance species prevention and control. EO 13112 (1999) directs federal agencies to prevent and control the spread of both terrestrial and aquatic invasive species. Federal actions must analyze and incorporate all reasonable measures to minimize the risk of introduction and spread of invasive species where appropriate. The Aquatic Invasive Species Act of Montana (MCA 80-7-10) would potentially be applicable on the Bighorn River. This law authorizes the use of check stations to prevent the movement of invasive species from infested to uninfested areas of the state and sets up "Invasive Species Management Areas" where certain restrictions apply to vessels or equipment exposed to state waters.

3.5.2 Presence and Treatment of Invasive Species in the Project Area

Table 3-6 lists noxious weeds identified by the State of Montana that could occur in Big Horn County (MTDA 2013, BONAP 2014). No lists specific to the Reservation were available. Of these, the noxious weeds known to be problematic in the project area include: Canada thistle; houndstongue; dalmatian toadflax; sulfur cinquefoil; leafy spurge; whitetop; field bindweed; spotted knapweed; and saltcedar (HKM 2007, Bockness 2014). No acreage estimates are available for these species in or surrounding the project area.

Table 3-6: Noxious Weed Species Listed in Big Horn County, Montana

Priority	Description of Priority Status	Listed Plant Species*
2A	Common in isolated areas of Montana	Perennial pepperweed (*Lepidium latifolium*)
2B	Abundant in Montana and widespread in many counties	**Canada thistle (*Cirsium arvense*)**
		Field bindweed (*Convolvulus arvensis*)
		Leafy spurge (*Euphorbia esula*)
		Whitetop (*Cardaria draba*)
		Russian knapweed (*Rhaponticum repens*)
		Spotted knapweed (*Centaurea stoebe*)
		Diffuse knapweed (*Centaurea diffusa*)
		Dalmation toadflax (*Linaria dalmatica*)
		St. Johnswort (*Hypericum perforatum*)
		Sulfur cinquefoil *(Potentilla recta*)

Priority	Description of Priority Status	Listed Plant Species*
		Common tansy (*Tanacetum vulgare*)
		Houndstongue (*Cynoglossum officinale*)
		Yellow toadflax (*Linaria vulgaris*)
		Saltcedar (*Tamarix spp*.)
3	Regulated, but not listed as noxious in Montana. May not be intentionally spread or sold other than as a contaminant in agricultural products.	Cheatgrass (*Bromus tectorum*)

*Species in bold are known within project area. Source: BONAP 2014, MTDA 2013

Weed control and management activities for the existing irrigation system are done by the BIA following a Weed Management Plan (HKM 2007, p. 35-37). The plan includes guidelines for operation of the weed program, and disposal, storage, transportation, and record-keeping of pesticides. While water-masters, ditchriders, and operators all participate in weed control, ditchriders do not use weed control sprayers or chemicals on their daily route. Most weed control is contracted out to a third party weed contractor. Control of brush and willow within irrigation canals is also conducted. The consistency and effectiveness of the program is not documented.

Aquatic weeds and algal blooms are also a current problem within the irrigation system canals (HKM 2007). Control is currently accomplished by application of chemicals, following the CIP Aquatic Weed Control Management Plan. Several restrictions limit the use of the chemicals because of high toxicity to fish.

Other than several non-native, invasive fish (discussed in Section 3.6.2), the only other invasive species documented in the project area is the New Zealand Mudsnail, which is recorded in the Bighorn River below the Yellowtail Dam (Project Record, Aquatic Invasive Analysis).

3.5.3 Direct and Indirect Effects to Invasive Species

Noxious weeds are likely to be present in portions of the project area and could spread as a result project construction activities. If existing populations of noxious weeds or invasive plants are present at a specific site, construction equipment could spread seeds or root fragments during clearing and grubbing activities. Seeds may adhere to equipment and be spread to other sites when equipment is moved. Soil-disturbing activities would potentially disturb and expose buried seed banks of noxious weeds. Bare soils provide an environment where noxious weeds typically establish and thrive, whether seeds of the species were already present or are newly dispersed into the area.

The effects of noxious weed or aquatic invasive species spread would be long-term, depending on the species and effectiveness of control efforts. Noxious weeds and invasive plants compete with native plant communities and could spread from the project area into surrounding native grassland. Aquatic invasive species and noxious weeds that spread via waterways could spread downstream from the project area; chances of dispersal would be highest in adjacent stream reaches, and would be reduced further downstream.

3.5.4 Conservation Measures to Prevent Invasive Species Introduction or Spread

Several measures implemented at key stages of the project would effectively minimize or prevent noxious weed outbreaks or invasive species spread due to construction activities. Prior to any soil or vegetation-disturbing activities for a specific site, a survey would be conducted to identify any noxious weeds or non-native plant populations currently present within the construction right-of-way. If noxious weeds are identified, treatment options (including biological, cultural, and chemical) would be evaluated by the IDT, as appropriate to the site. Construction contractors would follow Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species* (DiVittorio et al. 2012) which includes measures for both terrestrial and aquatic species.

Revegetation would mitigate the introduction or spread of noxious weeds in the area by minimizing the time disturbed soils are exposed. When construction is complete, seeding and mulching would be done where soil has been disturbed outside of the canal prism, in non-cropland areas. Seedbed preparation would include removal or treatment of noxious weeds or infested topsoil. Fertilizing would not be done since this promotes the competitive ability of weeds. Seed mixes would be native species and would include a cover crop, unless the landowner desires otherwise. Seeding would be done as soon as possible after construction is complete, depending on the seed mix and local NRCS timing guidelines, to reduce the potential for invasive weed species from becoming established.

3.5.5 Cumulative Effects to Noxious and Invasive Species

Though comprehensive records of the type and extent of noxious weeds and other invasive species are unavailable for the project area, presumably there are populations that occur in the area. Past, current, and future introductions have resulted and will continue to result from human activities across the landscape such as agriculture and transportation. The construction activities associated with this project would represent incremental opportunities for the spread of noxious weeds or aquatic invasive species through the disturbance of extant populations and soil-disturbances. Several mitigation measures and practices would prevent or ensure these opportunities are kept to a minimum.

3.6 FISHERIES

Public concerns over water quality (Key Issue #1, Section 1.6.2) are mainly centered on the impact to the renowned trout fishery in the Bighorn River and subsequent economic impacts to angling and lodging businesses dependent on that fishery (Key Issue #2). An additional concern is that CIP diversion dams within river channels block fish movement upstream and that no barriers are in place to screen fish from being diverted into the headworks of the irrigation system (Key Issue #5).

A broad summary of fisheries resources will be presented for all rivers and streams in the project area. However, more in depth analysis will be focused on the trout fishery of the Bighorn River.

3.6.1 Fisheries Regulations

Section 2 of the Fish and Wildlife Coordination Act (FWCA) of 1958 (P.L. 85-624, as amended, and 40 CFR 1502.25) states that fish and wildlife conservation shall receive equal consideration with other project purposes and will be coordinated with other features of water resources development projects. Development activities that would potentially pertain to this project include the diversion of the waters

of any stream or the control or modification of a stream or other body of water for any purpose, including navigation and drainage. Consultation with the USFWS is required.

In 2002, the Crow Tribal Legislature designated Yellowstone Cutthroat Trout a "species of special concern" on the Crow Reservation under Joint Action Resolution number JAR0231 (Crow Tribal Legistlature 2002). State-level fisheries regulations do not apply on the Reservation, however MFWP resources were utilized for information on fish species of concern in the area.

Within the Reservation boundary, the State of Montana has the authority to manage fishing in Bighorn Reservoir, Afterbay Dam, and the Bighorn River proper. The Crow Tribe is responsible for management of all other waters within the reservation boundary (MFWP 2013a).

Reclamation controls releases from Yellowtail Dam to the Bighorn River with the following instream flows to maintain its fishery, as defined in the SLLMP (listed below). Instream flows have first priority use over all other uses.

- Optimum Instream Flow: A minimum flow target of 2,500 cubic feet per second (cfs) (equivalent to 1,809,917 AFY). Under current conditions, this flow level provides good spawning, rearing and cover conditions for fish in all major side channels. Optimum Instream Flow shall be provided as consistently as possible as determined by the monthly plans.
- Standard Instream Flow: A minimum flow target of 2,000 cfs (1,447,934 AFY). Under current conditions, this flow level provides adequate spawning and rearing conditions for fish in most side channels but cover for adult fish is limited. Standard Instream Flow shall be provided when water is not available to meet Optimum Instream Flow as determined by the monthly plans.
- Minimum Instream Flow: During low flow periods, the minimum flow target is 1,500 cfs (1,085,950 AFY). Under current conditions, this flow level protects main channel habitat for fish but not important side channels. Fish populations will decline at this flow level. Minimum Instream Flow shall be provided when water is not available to meet Optimum or Standard Instream Flow or for other special circumstances. (SLLMP, Sect. 4.C.1 to 4.C.3)

3.6.2 Existing Fisheries Resources

Project Area Fisheries

Rivers and streams in the project area support aquatic communities comprised of native species and popular, introduced sport fisheries (**Table 3-7**). Pryor Creek, the Little Bighorn River, and other tributaries are warm-water systems supporting species adapted to relatively warm temperatures and high turbidity. The tailwaters of the Bighorn Reservoir in the Bighorn River provide habitat for a mixture of cold-water and warm-water species. Headwater reaches throughout the project area provide cold water habitat for native Yellowstone cutthroat trout, a species of concern whose range has been reduced due to changing habitat and introduction of exotic species (MFWP 2013b; Crow Tribal Legislature 2002). Taxa lists for each stream are provided in the Project Record (Fisheries Analysis).

Table 3-7: Fish Species of the Project Area

Native Species	Exotic Species
Brassy Minnow**, Burbot**, Channel Catfish, Emerald Shiner, Fathead Minnow, Flathead Chub, Goldeye, Lake Chub, Longn ose Dace, Longnose Sucker, Mountain Sucker,	Black Bullhead, Black Crappie, Bluegill, Brook Trout, Brown Trout, Common Carp, Green Sunfish, Largemouth Bass, Northern Pike, Pumpkinseed, Rainbow Trout, Smallmouth

Native Species	Exotic Species
Mountain Whitefish, Plains Minnow, River Carpsucker, Sauger*, Shorthead Redhorse, Stonecat, Western Silvery Minnow, White Sucker, Yellowstone Cutthroat Trout*	Bass, Walleye, Yellow Perch

*Species of Concern, **Potential Species of Concern; Source: MFWP 2014a; Crow Tribal Legislature 2002

Bighorn River Trout Fishery

The Yellowtail Dam was completed in 1967 as a means of controlling flooding and providing irrigation water. Its creation dramatically altered the fisheries potential of the Bighorn River. Historically the river supported a warmwater assemblage of riverine species, with native cutthroat trout in side-channels (MFWP 2013a). The release of cold, clear, nutrient rich water now supports a world class tailwater fishery for rainbow and brown trout from Fort Smith to Hardin. Downstream of Hardin the fishery transitions into smallmouth bass, walleye, sauger, burbot, and channel catfish (MFWP 2013a).

Optimal habitat for the trout species in the project area is characterized by clear, cold water; a silt free rocky substrate, with areas of slow, deep water; well vegetated stream banks; abundant instream cover; and relatively stable water flow, temperature regimes and stream banks (Hickman and Raleigh 1982, Raleigh et. al. 1984, Raleigh et. al. 1986). Trout spawn almost exclusively in streams. Cutthroat trout have a preferred temperature range from 53.5 to 59 °F and do not usually persist in waters where maximum temperatures consistently exceed 71.5°F (Hickman and Raleigh 1982). Both Rainbow and brown trout have an optimal temperature range starting at 53.5°F as well, however both species are able to thrive in slightly warmer waters, with optimal upper temperature ranges of 66°F and 64.5°F, respectively (Raleigh et. al. 1984, Raleigh et. al. 1986).

The Bighorn River's trout fishery peaked in the late 1990s with reports of 11,000 catchable trout per mile (Maffly 2007). However, drought and lack of outflows from the dam starting in the 21st century have reduced the number of trout per mile to 3,000. The 13-mile stretch of river beyond the dam holds the highest number of trout, with concentrations diminishing rapidly as the water warms farther from the dam (Maffly 2007). The warm-water resistant brown trout are found all the way to Two Leggins.

Management of the Bighorn River fishery is accomplished through adjustment of outflow and retention of water at the Yellowtail Dam. Criteria for water releases from the Yellowtail Dam were developed specifically to support the trout fishery downstream (MFWP 2013a). The creation of the dam has also reduced spring flows and increased sedimentation, which has plugged side-channel habitat. Side-channels provide spawning habitat and a safe place for juvenile trout to winter (Hunter 1991). Furthermore, brown and rainbow trout encroach in native Yellowstone cutthroat habitat. For these reasons, restoration efforts are on-going to implement structures to keep the introduced species out of historical cutthroat areas and create side-channel habitat needed to improve the populations of the native trout species (MFWP 2013a).

Irrigation systems along trout streams are known to affect fish in a number of ways. Entrainment into irrigation diversions can result in loss of both adult and juvenile trout. Diversion structures can create barriers to fish movement. Irrigation withdrawals can lower the water depth of natural stream channels which results in warmer temperatures, resulting in stress or mortality to trout. Irrigation withdrawals can also reduce recruitment when the irrigation season coincides with incubation, emergence and drift of trout fry. Furthermore, irrigation return water flowing back into natural streams often are higher in

temperature and carry nutrients, chemicals, and sediment which impact overall water quality for trout (MFWP 2013b).

The existing CIP system currently has impacts to the Bighorn River trout populations. According to MFWP biologists, reduced water quality from irrigation returns is the most significant impact to the trout fishery; however these impacts have not been quantified (Ken Frazer, Fisheries Manager, MFWP, pers. comm., 2014). Conversely, entrainment and irrigation withdrawals are not currently concerns and have little to no measureable impact on trout populations (Ken Frazer, pers. comm., 2014).

3.6.3 Direct and Indirect Effects on Fisheries

Temporary effects on fisheries would potentially occur during construction work at diversion dams or headworks within stream channels. Localized impacts from increased sedimentation could occur during and immediately following construction; however, these would be minor and of short duration. Implementation of construction BMPs such as silt curtains or other measures identified within project SWPPPs, if required, would ensure sedimentation impacts are minimized and localized to the immediate project work area. Most streams in the area have a naturally high sediment load to which fish species have adapted. The exception is the tailwater trout fishery below the Yellowtail Dam on the Bighorn River. However, the relatively short duration of disturbance combined with implementation of best management practices would limit temporary construction impacts to this fishery.

Since no functional fish protection structures are currently in place within the CIP, rehabilitation of CIP structures would result in no net change to current rates of entrainment or blockage of fish movement at diversion dams. In the Bighorn River, entrainment and effects to fish movement from irrigation structures are not thought to result in population level effects to the trout fishery (Ken Frazer, pers. comm., 2014). The canal cleaning and reshaping efforts of the proposed action (Phase 2) would help to keep the canals uniform without refuge for fish, which would induce fish to return to the stream and potentially reduce entrainment losses (MFWP 2013a).

The rehabilitation of the CIP system, along with on-farm improvements (Phases 1, 2, and 3), would increase the efficiency of the system, thus reducing the amount of water needed for irrigation and in turn reducing the amount of irrigation return water, sedimentation, and chemical and nutrient contamination going back into streams (Section 3.3.6). These improvements in water quality are expected to result in measurable differences from the current system, though not quantifiable at this time due to limited data. Since water quality is known to affect the Bighorn River trout fishery, the trout population is anticipated to benefit in the long-term due to the repairs to the system. The reduced amount of water needed for irrigation would also potentially contribute to in-stream flow for the trout fishery, though this would also depend on operation of the headworks which is independent of system repairs. Similar long-term effects would be expected for fisheries within stream reaches of the CIP system in other streams of the project area.

The development of Dunmore Bench (Phase 5) may include more water pumped directly from the Bighorn Main Canal. This would require more water to be diverted above the fishery to serve the additional irrigated land. However, since Reclamation is required to release water in the amount equal to all new development in the reach that includes the Bighorn Irrigation Unit (SLLMP, Sect. 2.D), instream flows would have no net change due to the Dunmore Bench development. By maintaining

instream flows compared to existing conditions, development of the Dunmore Bench would not result in impacts to the Bighorn River trout fishery.

If a separate diversion was constructed off the Bighorn River to serve Dunmore Bench, it would be below the reach of the trout fishery and thus would have no effect. A new diversion would impede movement of other fish species and could increase chances of entrainment into the irrigation headworks at that point of the river. Populations of other species may be affected but the extent is currently not quantifiable at this time.

The additional irrigated lands of Dunmore Bench would contribute to reduced water quality because there would be potential for increased sedimentation and chemical and nutrient contamination into irrigation return waters. However, any returns from this area would be entering the Bighorn River below the trout fishery; therefore, while there may be an impact to other fishes and aquatic life in lower reaches of the Bighorn, there would be no impact to the trout fishery.

3.6.4 Conservation Measures for Fisheries

Temporary effects to fisheries during construction would be limited through the implementation of BMPs and a site-specific SWPPP as required, which would include practices for control of water runoff and drainage, sediment discharge, erosion, and prevention of spills. On the Bighorn River, state laws may be applicable to ensure protection of streambeds (refer to Section 1.7), which would pertain during rehabilitation or repair of any diversion or headworks structures within the river channel. Permits would involve incorporating comments from MFWP biologists and conservation district personnel to minimize impacts to fish and other aquatic life.

Though entrainment and barriers to fish movement caused by the existing CIP system are not known to have population level effects to the Bighorn River trout fishery, any effects to other fish species or effects in other streams would be mitigated by the construction of fish protection structures (Section 2.4.3). This is a design alternative option to be considered during site-specific IDT review. Passage structures would allow fish to migrate naturally through stream channels supplying the CIP system. Screens would prevent fish from entering the diversion into the irrigation system, thus reducing fish loss.

Half of the water salvaged from gains in irrigation efficiency due to rehabilitation of the system would be put toward maintaining in-stream water flows for the Bighorn River for the benefit of the trout fishery (SLLMP, Sect. 2.C). However, implementation of this measure would be dependent on a change in operation of the Bighorn Unit headworks, which is outside the scope of the proposed actions.

These measures would minimize potential negative impacts to fisheries from the proposed project actions. Overall the project is anticipated to benefit fish populations with the potential for further benefits via optional measures and improved operations.

3.6.5 Cumulative Impacts to Fisheries

The main factors affecting Bighorn River trout populations are poor water quality and warm water temperatures, which are due to the cumulative effects of past and current actions that release contaminants and sediment into the river, including mining, agriculture (including flood irrigation and

the existing CIP), and livestock production (Section 3.6.2). Sufficient instream flow is the other major requirement in sustaining the fishery. Releases from Yellowtail Dam, which take into account many cumulative factors upstream and downstream of the project area, determine instream flow. While diversion to the existing CIP removes water from the river, the amount diverted is not thought to be a large enough influence to affect trout populations compared to the effect of releases from the dam. Therefore, the main influence to cumulative fishery effects from completion of the proposed project would be the potential improvements in water quality (Section 3.3.8). The project would also modify the infrastructure of the system in such a way that operations could become much more refined and effective. Improved operations would result in even greater beneficial impacts to both water resources and fish populations.

Other foreseeable development in the area that would contribute incrementally to impacts to fisheries include a proposed power plant at the Afterbay Dam and an MR&I system with a water intake in the Bighorn River. Potential impacts from these projects would include mortality from turbines or "gas bubble trauma" from the power plant and localized concentrations of existing river contaminants at the MR&I water treatment station. The magnitude of these effects would be evaluated in conjunction with development of those projects.

3.7 SOCIOECONOMICS

The need for the project is primarily socioeconomic, and as such has been identified as a key issue (Key Issue #2, Section 1.6.2). Due to the current condition of the CIP, it does not serve the potential number of users and land acres that it could serve if the system was rehabilitated and improved. Improving agricultural production through consistent water supply is tied to individual income generation and thus the local economy. Several public commenters emphasized the economic value of angling, service/accommodation, and other recreational/tourism-based businesses that the Bighorn River provides and the dependence of those businesses to the health of the trout fishery and thus the water quality of the river. There was also public recognition of the economic value of the cropland irrigated by the CIP.

The socioeconomic analysis focuses on the Crow Indian Reservation, since the Crow Tribe as a whole is the intended recipient of socioeconomic benefits of the project. The reservation boundary also defines the reasonable extent of impacts to local businesses and local economy. Because of limited data, analyses were based first on the immediate project area, then the portion of the Reservation within Big Horn County, then the Reservation as a whole, and finally Bighorn County as a whole. The northwestern corner of the Reservation in Yellowstone County was excluded for some analyses because it includes the Billings metropolitan area; it has characteristics different from the remainder of the reservation and is further in distance from the project.

3.7.1 Overview of the Population of Crow Reservation

The 2.2 million acre Reservation is primarily rural with a number of dispersed small towns. The population of the entire Reservation (US Census 2010) was 6,863, and the population density of Big Horn County, which comprises the majority of the Reservation, was approximately 2.2 people/square mile. The six communities on the Reservation, which also have the majority of the population, are Crow Agency, reservation headquarters (1,616), Fort Smith (161), Lodge Grass (428), Pryor (618), Saint Xavier (83), and Wyola (215) (US Census 2010).

3.7.2 Economy & Businesses of the Crow Reservation

In the past, agriculture has been a significant part of the reservation economy, including both livestock and crop production. Livestock production is primarily cattle, horses, and bison. Crop production includes wheat, barley, hay, corn, and oats (Montana Research and Analysis Bureau 2013). Between 2002 and 2007, the number of farms on the Reservation increased from 377 to 492. The number of farms less than 1,000 acres increased the most, as did the number of farms owned by individuals and partnerships. Corporate farms only increased slightly. Most farms are owned and operated by the person or family living there with the average age of operators approximately 52 years old. (Montana Research and Analysis Bureau 2013).

Data is not available for the Reservation or the project area on the market value of agricultural products sold, though data is available for Bighorn County as a whole. Crop sales were $41,363,000 in 2007 for Bighorn County, an increase of 44 percent since 2002. Livestock sales totaled $53,492,000 in 2007, an increase of 56 percent since 2002 (USDA-NASS 2007).

Agriculture is still a part of the reservation economy. However, in recent years, the Crow Tribe has been exploring opportunities to mine coal reserves located within the boundaries of the Reservation (Gardener 2013). The Reservation lies in the Powder River Basin, a coal-rich region that straddles the border of Montana and Wyoming. The active coal mines on the Reservation include Spring Creek Mine, Absaloka Mine, West Decker Mine and East Decker Mine, which are mainly located within the eastern one-third of the Reservation. The Crow Tribe currently derives about two thirds of its budget income from the Absaloka coal mine, which mines an average of 5.5 million tons per year (Gardener 2013). If the Tribe's coal resources continue to be developed, it has the potential to contribute the majority of income to the Tribe, and create additional jobs benefiting individual households both on and off the Reservation.

Recreation and tourism accounted for approximately $34 million in revenue in Big Horn County as a whole (ITRR 2004a). Of those visiting the Reservation, a majority (61%) were in the area primarily for fishing (ITRR 2004b). The Bighorn River has a world-renowned trout fishery which was created by the construction of the Yellowtail Dam in the mid-1960s. Tailwaters released from the dam provide cool temperatures necessary for trout habitat, which can extend as far as 20 miles downstream. The height of trout productivity occurred in the 1990s, when anglers spent an average of $13 million in the area each year (Maffly 2007). Drought in the 2000s reduced dam releases, which in turn affected trout habitat downstream and reduced the trout population. Bighorn River use has dropped from a peak of 125,000 angler days in the late 1990s to roughly 70,000 in 2007, according to MFWP, accompanied by an associated reduction in revenue (Maffly 2007).

Other major attractions within the Reservation adjacent to or near the project area are the Bighorn Canyon National Recreation Area, located just south of Fort Smith; the Little Bighorn Battlefield National Monument, located just southeast of Crow Agency; the annual Crow Fair and Rodeo, which includes one of the largest powwows in the United States, held in Crow Agency; and the historical Bozeman Trail which crosses the Bighorn River near Fort Smith (refer to Section 3.9 Cultural Resources for more information on the Bozeman Trail).

3.7.3 Irrigation Currently within Project Area

In 2006, the CIP served approximately 1,118 water users. Current irrigation practices include flood, furrow, wheel-lines, and sprinklers with unlined ditch, lined ditch, and gated pipe as distribution systems. The primary irrigated crops are hay and alfalfa, irrigated pasture, sugar beets and grains (Bartlett & West 2014).

According to current BIA records, an estimated 38,061 acres are considered PA within the 11 irrigation units of the project area (**Table 3-8**) (BIA 2013). However, another 7,841 acres are designated Temporarily Non-Assessable (TNA).

Table 3-8: PA and TNA Acreage by Irrigation Unit

Irrigation Unit	PA Acres	TNA Acres	Totals
Bighorn	22,325	2,166	*24,491*
Agency	3,522	1,202	*4,724*
Lodge Grass #1	2842	483	*3,325*
Reno	2,177	516	*2,693*
Wyola	2,428	177	*2,605*
Forty Mile	621	107	*728*
Pryor	1,171	1,451	*2,622*
Soap Creek	1,005	529	*1,534*
Lodge Grass #2	586	590	*1,176*
Two Leggins	1,384	271	*1,655*
Bozeman Trail	0	349	*349*
Total Acres	**38,061**	**7,841**	**45,902**

Source: BIA 2013

3.7.4 Direct and Indirect Effects to Socioeconomics on the Reservation

The need for the project is primarily socioeconomic, and therefore is anticipated to provide positive benefits to individual CIP irrigation users as well as the local economy. Potential results of the project include improved CIP productivity with reduced overall water demand; improved water drainage on land currently idled due to excessive water accumulation; and irrigation water provided to lands formerly irrigated, but currently lacking access to service or having water shortage.

Long-term, the project would improve the water supply and irrigation in specific areas of the Reservation. This would provide water users with a more consistent and better supply of water, which would have a direct effect on their ability to grow crops and raise livestock. Based on data from the U.S. Census, it appears that in many cases, farming is the water user's (i.e., farmer's) main source of income. The project would have a potentially positive economic impact on individuals and households. It is anticipated that the project could increase household income for these users, but would also be dependent on other market factors affecting agricultural commodities. In the long-term, increased household income would contribute to a stronger local and regional economy.

If the future opportunities associated with the project are realized, additional positive economic impacts may occur locally and regionally, including bringing idle acres back into production on Indian lands and expanding irrigation services to Indian lands near the project. These project elements would have potentially positive economic impacts to Tribal members and the Tribe. It would allow more Tribal members to benefit from a consistent water supply for agricultural production, resulting in potential future income (see also Section 3.8).

Another potential long-term result of the project would be a positive effect on the revenue generated by businesses associated with the trout fishery of the Bighorn River. Repairs and improvement to the CIP system would potentially improve the water quality of irrigation returns, providing a positive impact to trout habitat and trout populations, and subsequently providing fishing opportunities and increased tourism dollars (Sections 3.3.6 and 3.6.3).

The project is also expected to have short-term positive socioeconomic impacts to the local area. Construction of the project would require work crews for its various phases. Project construction has the potential to create jobs for qualified local Indians and Indian-owned businesses. This would have a potentially positive economic impact on the local economy. The Tribal Employment Rights Office (TERO) has implemented an ordinance for the Crow Reservation that requires employment and contracting preference is given to Native Americans, especially those that live locally. The TERO ordinance applies to all projects using government funding. In the first several years of the project, an estimated 10-40 crew members would be required for construction work; within the next five years, this number could increase to as many as 60 crew members (Bartlett & West, pers. comm.). The availability of construction jobs would last the duration of the project, anticipated to be 10-20 years.

Since construction workers would primarily be local, they may use local businesses (restaurants and gas stations) that would potentially cause small increases in revenue for those businesses and associated sales taxes on the local or county level for the duration of project construction. Overall, project construction would contribute to individual and household income for construction workers from the region for construction duration. The potential effect of this on the Reservation and the Tribe is not quantifiable at this time, but is anticipated to be negligible.

No additional permanent jobs are needed for operation and maintenance of the project. There are no effects anticipated on housing or public services such as schools and hospitals. The project would be funded using federal funds, and therefore no additional costs to the County, school district, or state are expected. No measureable effects on population, unemployment, demographic measures or shifts in job sectors are anticipated due to the project.

3.7.5 Cumulative Effects to Socioeconomics

This project would provide a measureable positive increase in the local economy in the short- and long-term, and would contribute to other foreseeable projects affecting socioeconomics on the Reservation. These projects include coal development, oil and gas development opportunities, and other water projects related to the Settlement Act.

3.8 TRUST ASSETS AND ENVIRONMENTAL JUSTICE

This project is being initiated and completed by the Crow Tribe with the broad purpose of benefitting the Tribe and its members. The public voiced concerns that the existing CIP has had limited benefits to trust lands and Crow farmers in the past, and some expressed doubt that this project would improve that situation (Key Issue #3, Section 1.6.2).

The analysis area for existing and potential effects on trust assets and minority and low-income communities followed that described in Socioeconomics (Section 3.7). Other specific analyses are described in appropriate sections below.

3.8.1 Trust Assets and Environmental Justice Policy

Trust Assets

Indian Trust Assets (ITAs) are "legal interests in property or resources held in trust by the United States for Indian tribes or individual Indians" (Indian Trust Policy issued July 2, 1993). The Secretary of the Interior is the trustee for the United States on behalf of Indian tribes. ITAs include land, minerals, timber, ethnobotanical resources, hunting and fishing rights, water rights, and in-stream flows. ITAs may be located on or off-Reservation lands. During the NEPA process, Reclamation, as a representative of the Secretary of the Interior, must evaluate whether the proposed action may affect ITAs. This policy reaffirms the legal trust relationship and the government-to-government relationship between the Secretary of the Interior and Indian tribes.

Environmental Justice

Executive Order 12898 (1994) requires that measures must be taken to avoid disproportionately high adverse impacts on minority or low-income communities by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means that minorities and low income groups would not bear a disproportionate share of negative human health or environmental impacts. Meaningful involvement means that affected populations have the opportunity to participate in the decision process and their concerns are considered.

3.8.2 Land Tenure within the Project Area

The United States government holds tribal and allotted acres of the irrigated project lands in trust for the Tribe and Tribal members. Reclamation and the BIA also have a responsibility to protect and conserve trust assets. Bringing idle acres back into production, expanding irrigated lands, and maximizing benefits to Tribal lands are ways this responsibility can be fulfilled.

The CIP serves both Tribal and non-Tribal farmers and land owners. Over time, changes in land uses and ownership on the Reservation have occurred such that the CIP now serves a larger number of non-tribal farmers compared to tribal farmers, though this difference has not been quantified (Bartlett & West, pers. comm.). In terms of acres of land, 2,602 PA acres (7%) are under tribal ownership and 17,497 PA acres (46%) are under allotted ownership of individual tribal members; whereas 17,962 PA acres (47%) are under Fee (non-Tribal) ownership (**Table 3-9**) (BIA 2013). Most of the allotted land is leased to non-Indian farmers. Within the potential Dunmore Bench development, 4,480 acres were estimated as Fee

lands for purchase and 2,640 acres were identified as land in trust (tribal or allotted) (Bartlett & West 2014).

Table 3-9: Presently Assessable (PA) Acreages by Irrigation Unit

Priority*	Irrigation Unit	PA Acres		
		Tribal	Allotted	Fee
1	Bighorn	2309	9377	10,639
2	Agency	13	1880	1,629
3	Lodge Grass #1	0	1550	1,292
4	Reno	11	889	1,277
5	Wyola	13	814	1,601
6	Forty Mile	0	356	265
7	Pryor	128	797	246
8	Soap Creek	59	400	546
9	Lodge Grass #2	0	172	414
10	Two Leggins	69	1262	53
11	Bozeman Trail	0	0	0
	Total PA Acres	**2,602**	**17,497**	**17,962**
	Percentage of Total	**6.8**	**46.0**	**47.2**

*Priority is based on the percent of combined tribal and allotted land in each unit of the total combined tribal and allotted land across all units. Source: BIA 2013, Bartlett & West 2014

3.8.3 Existing Minority and Low Income Populations

Several analysis areas were used to establish a baseline of the existing distribution of minorities and low income populations within and surrounding the project area. The analysis levels include: project area-specific census tracts (Big Horn County only); Reservation-wide tracts (including portions of two counties); Big Horn County as a whole; Yellowstone County as a whole; and the state of Montana. These levels were established to ensure that analyses included relevant components of the Reservation and counties to reflect the community potentially affected by the project (see Project Record for further details).

The American Indian population on the Reservation was 77.5 percent, compared to 65.1 percent for Big Horn County, 0.04 percent for Yellowstone County, and 7.9 percent in the state (**Table 3-10**). American Indians comprised nearly the entire portion of the minority population segment for all geographic areas evaluated, except in Yellowstone County, where they comprised only 29 percent of the minority group. Approximately 70 percent of over 13,260 enrolled tribal members live on the Reservation (Montana Research and Analysis Bureau 2013).

According to Census data (2008-2012), 30.9 percent of the population on the Reservation was below the federal poverty level, compared to 26.8 percent of the Big Horn County population, 11.9 percent of Yellowstone County, and 14.8 percent of the state population (**Table 3-10**). The average median household income on the Reservation between 2008 and 2012 was $39,230 compared to Big Horn County at $36,803, Yellowstone County at $50,608, and the state median household income of $45,456 (**Table 3-10**) (U.S. Census Bureau 2012). In a separate analysis, the Crow Tribe reported the median

household income in 2008 for tribal members as $26,250, which was below the state median household income of $40,627 in that year (Crow Tribe 2008).

Table 3-10: Minority and Low-Income Populations, 2008-2012 5-Year Average

Location	Total Population	Percent Minority	Percent American Indian	Percent Below Poverty Level	Median Household Income
Project Area (Reservation, Big Horn County only)	6,863	79.6	77.5	30.9	$39,230
Big Horn County	12,872	64.0	65.1	26.8	$36,803
Yellowstone County	148,191	7.3	0.04	11.9	$50,608
Statewide	990,785	8.0	7.9	14.8	$45,456

Source: U.S. Census Bureau 2008-2012

The unemployment rate on the Crow Reservation according to the U.S. Census Bureau, between 2007 and 2011, was 28.3 percent compared to approximately five percent for the state of Montana. This rate included all of the labor force living on the Reservation. According to the BIA, the unemployment rate for tribal members on the Reservation was 46.5 percent in 2005.

Poverty levels and minority populations on the Reservation within the project area are significantly greater than the state and Yellowstone County, but comparable to Big Horn County. Per capita income is comparable to the general population in Big Horn County, but is approximately $12,000 less than Yellowstone County and the state median household income levels.

3.8.4 Existing Environmental Hazards

Environmental Justice concerns relate to existing hazards that may affect the health of individuals or communities, especially with low incomes. Existing hazards in the vicinity of the project area include hazardous waste generators regulated by Resources Conservation and Recovery Act (RCRA) and Brownfield sites. Brownfield sites are property which may be contaminated with a hazardous substance or pollutant. The EPA has a program to assess, clean up, and rehabilitate these sites (USEPA 2012). There are twelve hazardous waste generators regulated by RCRA within approximately 2 miles of the project area boundaries, these include an operating coal mine located east of Hardin, hospitals, a power plant (Hardin Generating Station) and a laundromat within Hardin city limits. Three Brownfield sites are near the project area, one located in Lodge Grass and two in Hardin (USEPA 2014a). Other existing environmental hazards include the City of Hardin Class II landfill (i.e. non-hazardous waste) (USEPA 2014b), and numerous oil and gas wells in Big Horn County (MBOGC 2014). The nearest SUPERFUND site is in the city of Billings, over 50 miles northwest from the project area (USEPA 2014a).

3.8.5 Direct and Indirect Effects to Trust Assets and Minority or Low Income Populations

The Crow Reservation largely consists of an American Indian population at an economic disadvantage compared to surrounding communities. The proposed improvements to the irrigation system would indirectly benefit the local reservation economy by improving the production and revenue generation primarily of the agricultural sector, but also fishery-based businesses. The project would also potentially result in bringing idle Indian lands back into production, expanding or consolidating irrigation services to Indian lands, and the purchase by the Tribe of fee lands, including the new development of the

Dunmore Bench area. These actions would result in overall economic benefits to the Tribe as a whole and other equity that comes with land ownership.

The project would also directly benefit a number of individual Tribal members and households. Short-term employment for up to 60 construction workers of Indian preference would be generated. Long-term economic benefits would result to Crow farmers using the irrigation system currently, with the potential for new Crow users with the expansion of irrigation services and Indian-owned lands. At this time the exact number of individual Tribal members who would benefit is not known. Current non-Indian farmers would also benefit by improvements to the system. To ensure the Tribe and its members receive the highest proportion of benefits at all stages, site-specific projects that affect the highest number of tribal and allotted acres explicitly receive highest priority (Section 2.2.2; Bartlett & West 2014).

The rehabilitation and improvement of the CIP is not anticipated to affect hazardous sites or facilities identified within or near the Reservation in Section 3.8.4, nor would any of those sites have an effect on the irrigation system. The CIP does not itself pose a hazard that would have negative health or environmental effects to minority or low income populations.

Impacts that would occur as a result of the project would be positive and would be directed toward the Crow Tribe or tribal members (see discussion in Section 3.7.4). Therefore, no adverse or disproportionately negative impacts are anticipated to minority or low income. Attempts to inform, solicit comments, and ensure the meaningful involvement of the Crow Tribe and general public in the decision making process of this project are detailed in Section 5.

3.8.6 Cumulative Impacts to Trust Assets

The project would increase the proportion of trust lands and Tribal farmers using the CIP system. The Tribe as a whole, and individual members, would benefit economically from expansion of irrigated trust lands. Therefore the project would contribute to positive cumulative effects to trust resources from other past, present, and future actions on the Reservation.

3.9 CULTURAL RESOURCES & SACRED SITES

Cultural resources encompass sites, objects, or practices of archaeological, historical, cultural and religious significance that are protected under various laws and regulations. Cultural resources are a key issue for the project (Key Issue #4, Section 1.6.2) since several of the existing CIP structures are eligible for listing on the NRHP. The location of the project on the Crow Reservation and the intention of project to benefit the Crow Tribe and trust assets dictates that it must proceed with particular sensitivity to Crow culture and heritage.

The analysis of cultural resources was focused within the project area, where potential impacts to cultural or sacred sites would potentially occur from project activities such as soil disturbance or removal/demolition of structures.

3.9.1 Cultural and Historic Regulations

Section 106 of the NHPA of 1966, as amended (16 U.S.C. 470a, et seq.) and its implementing regulations 36 CFR Part 800 requires that federal actions take into account the effect of a proposed action on cultural resources included in or potentially eligible to the NRHP. Federal agencies must consult with Historic Preservation Officers who are responsible for administering programs at the state or tribal level. The Crow THPO maintains Tribal register of cultural places, properties composed of religious sites, traditional cultural properties, burial sites, archeological sites, districts, buildings, and structures significant to the history, life ways, and customs of the Apsáalooke (Crow THPO 2013). The THPO also issues associated permits for excavation and construction projects within the exterior boundaries of the Crow Reservation (Crow THPO 2013).

The NAGPRA allows tribes to protect American Indian graves and to repatriate human remains; it applies to all developments regardless of the funding source if a burial site is identified during construction.

3.9.2 Historical Context and Components of the Existing CIP

A Class I Cultural Resource Inventory literature and file search has been completed for the existing irrigation facilities on the Crow Reservation which also summarizes the historical context of the CIP (Fandrich 2007). The Class I overview recommended the entire irrigation system as eligible for listing in the NRHP under Criterion A (properties associated with significant events), and some individual structures and components are recommended eligible for listing in the NRHP under Criterion C (properties with distinctive method of construction) (Fandrich 2007). The NRHP Criteria for Evaluation are guidelines that were established to evaluate the significance of prehistoric and historic properties.

The CIP is an important part of the history of the Crow Reservation. The political, economic, and social history surrounding the creation of the irrigation system is an expression not only of how agriculture was foreseen by government agents as a means of making the Crow economically self-sufficient, but also how that vision was perceived by the Crow and how that vision changed through time among both Indians and Whites. In this respect, all of the Crow irrigation systems are recommended NRHP eligible under Criterion A (Fandrich 2007).

The majority of the irrigation system was built with standardized features and methods of construction and is unlikely to be individually significant under NRHP guidelines (Fandrich 2007). The only known architectural elements within the CIP currently recommended eligible for listing in the NRHP are hand-laid stone masonry structures and regionally manufactured cast iron components. The stone masonry construction is a distinctive method of construction that appears to have been used primarily in the construction of major structures, such as the Agency Unit headgate. Cast iron components found in the CIP primarily consist of gates and gate lift mechanisms (Fandrich 2007).

3.9.3 Other Known Cultural Sites of the Project Area

The historical Bozeman Trail crosses the Bighorn River near Fort Smith within the boundaries of the project area. Traces of the trail are still visible in some locations. It was used from 1864 until 1866 to connect the Oregon Trail to the recently discovered gold-strike country in the north, allowing settlers access to what would become Montana. However the trail crossed through what was then the territory

of several Indian tribes, and numerous fights occurred. In 1868 U.S. military forces signed a treaty with Lakota war chief Red Cloud and withdrew their forces, effectively closing the Bozeman Trail (NPS 2014).

No other Class I inventories were available for the project area to identify previous cultural investigations or other known historical or archeological sites of the area.

3.9.4 Traditional Religious & Sacred Sites

The Crow (Apsáalooke) Tribe retains many of its traditional beliefs, culture, and knowledge (Reed 2002). Many of the religious and sacred sites of the Crow are located outside the present-day boundaries of the Crow Reservation, since the Reservation is only a small portion of the original extent of Crow territory, having been ceded and reduced by various treaties and policies of the US government. Religious or sacred sites that are tied to particular locations and are considered "Prestigious Historical/Sacred Sites" by the Crow THPO include rock art, fasting sites, siege sites, camp sites (teepee rings), mourning sites, and final resting places (scaffolds, lodges, large rocks or boulders, larger trees along waterways, rock ledges) (Reed 2002).

3.9.5 Direct and Indirect Effects to Cultural Resources

Potential effects to cultural resources would be direct and permanent. Potential effects include the removal and replacement of historical irrigation structures, of which some specific types have been recommended as eligible for NRHP listing (Section 3.9.1) or disturbance or destruction of previously undiscovered cultural resources during soil disturbance or excavation during construction. The overall project would alter the CIP system as a whole, which in its entirety has also been recommended as eligible for NRHP inclusion (Section 3.9.1).

3.9.6 Conservation Measures

As part of the proposed project actions, conservation measures for cultural resources would include avoidance or mitigation as required by THPO or BIA. A Class III Cultural Resource Inventory would be completed prior to any on-the-ground activities to identify any cultural, historical, or sacred sites within proposed areas of disturbance or excavation (including borrow sites) and would include site-specific mitigation recommendations. Each site-specific Class III report would be submitted to THPO for concurrence and to obtain further guidance for mitigation and necessary permits. Conservation measures would include avoidance, modification of routes, archeological excavation, and documentation through high quality photographs and drawings (in the case of NRHP eligible irrigation structures).

The Class I Inventory of the existing CIP system recommended that two distinctive architectural elements be looked for when conducting Class III field inventory of irrigation structures: hand-laid masonry and cast iron components (Fandrich 2007). The Class I Report further recommended that any individual structures exhibiting unusual design or method of construction identified during field inspection should be noted for further NRHP eligibility evaluation (Fandrich 2007). It was also recommended that a list of standardized feature types and methods of construction be compiled by irrigation engineers and reviewed by cultural resource specialists so that these classes of structures can be excluded under NRHP Criterion C and allowed to be replaced without further evaluation (Fandrich 2007).

If cultural resources or burial sites are discovered during construction activities, work would be stopped immediately, the site secured, and the THPO would be notified. Work would not resume until there is authorization to proceed. The Apsáalooke consider human remains and burial sites sacred (Reed 2002); disturbing or removing any remains would be avoided. Project workers would be prohibited from collecting artifacts or disturbing cultural resources in any area, under any circumstances.

Therefore, with these measures in place, minimal impacts to cultural resources would result from the proposed project actions.

3.9.7 Cumulative Effects to Cultural Resources

With the implementation of conservation measures, the project would avoid or minimize impacts to cultural resources and thus, would not measurably contribute to cumulative effects on cultural resources from other past, present, and reasonably foreseeable future actions.

3.10 VEGETATION COMMUNITIES & LAND COVER

Vegetation and land cover were not identified as key issues for the project. However, native plant communities may be disturbed in areas of new construction. Additionally, the effects of the project on willows and other culturally significant plants were identified as items of concern during public comment. Therefore the vegetation resources of the project area are addressed. The analysis was limited to the footprint of the project area.

3.10.1 Vegetation Regulations

The Crow Tribe does not have any laws that specifically apply to vegetation or plants. However the Crow Tribal Culture Department has a policy that certain plants important for cultural practices be protected from destruction, contamination, and eradication. The policy includes medicinal plants and roots, ceremonial foods, trees (particularly those identified as potential final resting places), and willows along waterways; however, no species lists are provided in the policy (Reed 2002).

Species of concern in Montana are tracked by the Montana Natural Heritage Program (MNHP). Plant or animal species listed under this program are considered rare, threatened, and/or have declining populations and are at risk of extirpation in Montana. These species may not necessarily be considered as threatened or endangered under the 1973 ESA and as such a Species of Concern is not a statutory or regulatory classification.

3.10.2 Existing Plant Communities and Land Cover

The project area is within the Northwestern Great Plains ecoregion (Montana Central Grasslands and Pryor-Big Horn Foothills), generally characterized as unglaciated semiarid rolling plains (Woods et al. 2002). Low precipitation and high summer temperatures restrict vegetation productivity throughout this ecoregion, and thus most of the area is used for rangeland. Agricultural production is restricted to areas near irrigation water sources, such as within the project area (**Figure 3-6**).

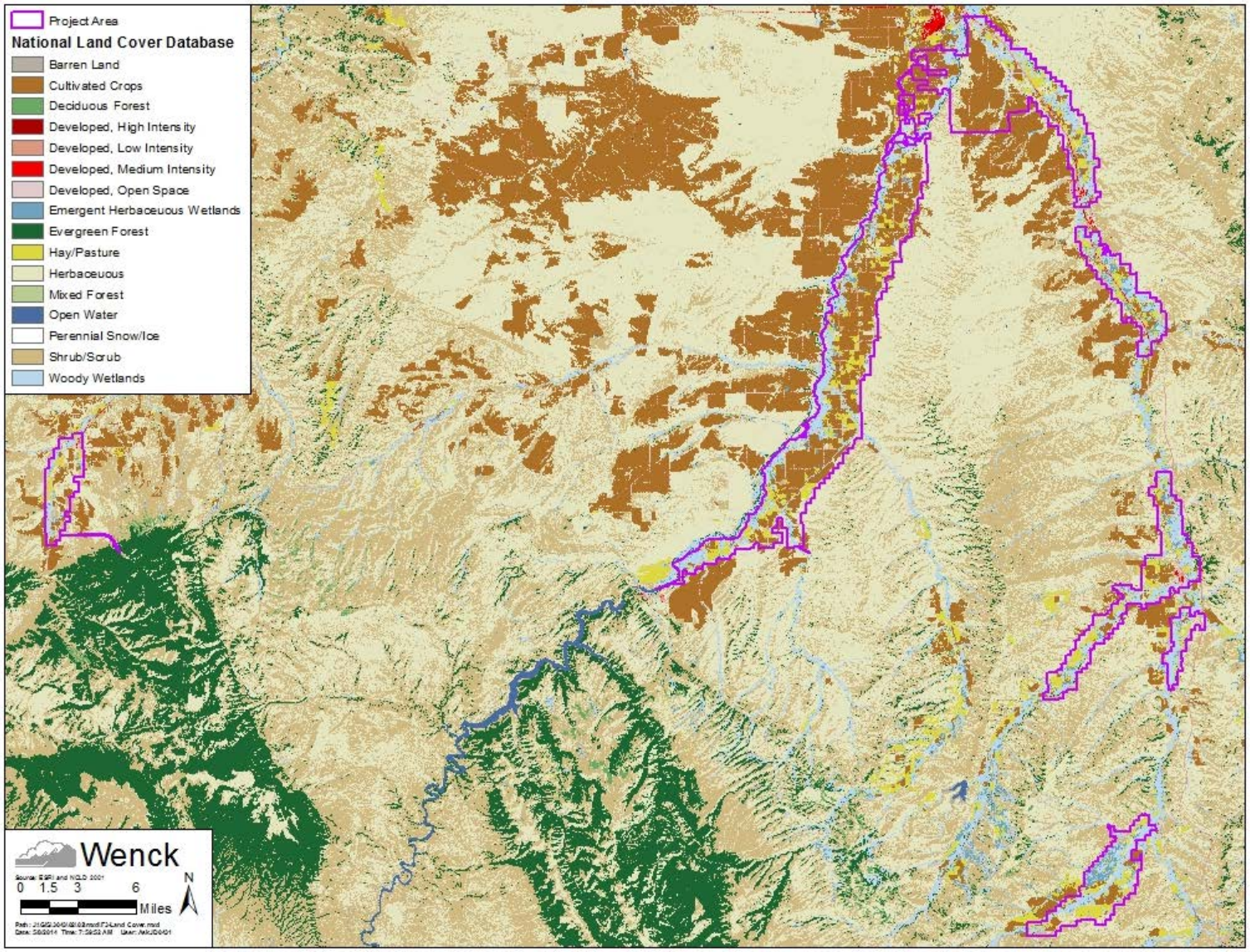

Figure 3-6: Land Cover Classifications Within and Surrounding Project Area

The project area and proposed activities would occur in what is currently agricultural cropland on relatively flat terraces along streams and rivers, where the natural vegetation has been converted to other uses (**Figure 3-6**). Some native grassland persists within the project area within steep or broken topography. Stream banks and irrigation canals are dominated by wetland or riparian species such as cottonwood or willow. Adjacent to and surrounding the project area along the Bighorn and Little Bighorn Rivers is native grama-needlegrass-wheatgrass grassland and scattered sagebrush vegetation. Adjacent to the project area along Pryor Creek are semiarid foothills and high benches of prairie, with shrub and tree growth typically restricted to canyons (Woods et al. 2002).

3.10.3 Rare or Culturally Significant Plants in the Project Area

Remnant native vegetation within the project area includes wetland/riparian habitat and sagebrush grassland; these areas are restricted to edges of agricultural fields or irrigation canals. A query of the MNHP database indicates that five (5) rare plant species may occur within wetland or riparian habitat within Big Horn County (**Table 3-11**). All plants have a global ranking of 5, meaning they are a common species but likely at the edge of their population range in Montana. No exact locations or acreage estimates are available in the project area for these plants.

Table 3-11: Plant Species of Concern That May Occur within the Project Area

Plant	Global/ State Rank*	Habitat	Reason for Listing
Spotted Joepye-weed (*Eupatorium maculatum*)	G5/S2	Wetland/Riparian	Widespread species known in Montana from a few occurrences in the south-central part of the state.
Persistent-sepal Yellow-cress (*Rorippa calycina*)	G3/SH	Wetland/Riparian	Regionally endemic with 4 records in Montana. Last species observed 30 years ago.
Desert Groundsel (*Senecio eremophilus*)	G5/S1S2	Wetland/Riparian	Known from at least 5 occurrences, including two historical collections. Little data available; may be more common than collections indicate.
Nannyberry (*Viburnum lentago*)	G5/S2S3	Riparian forests	Three known occurrences in eastern Montana
Heavy Sedge (*Carex gravida*)	G5/S3	Wetland/Riparian	Found in few widely scattered locations in eastern Montana generally in green ash woodlands. It is likely that the species is more abundant than current data shows.

Source: MNHP 2013

*The international network of Natural Heritage Programs employs a standardized ranking system to denote gobal (G) or state (S) status. Species are listed on a scale from 1-5, 1 being the highest risk of extinction or extirpation and 5 being common, widespread, and abundant. Modifier "H" denotes species that were historically known from records usually greater than 40 years old.

No potential habitat is present within the project area for other listed plant species that could occur in Big Horn County. No plants listed as threatened or endangered under the ESA are present within the project area.

Many native plants are culturally important to the Crow Tribe and are used for food, medicinal, and religious or spiritual purposes. Culturally significant plants that may be present within the project area in grassland or wetland habitats include: arrowleaf balsamroot (*Balsamorrhiza sagittata*); Buffaloberry

(*Shepherdia argentea*); cattail (*Typha* sp.); chokecherry (*Prunus virginiana*); purple coneflower (*Echinacea angustifolia*); dandelion (*Taraxacum officinalis*); flax (*Linum* sp.); sage (*Artemisia* sp.); sweetgrass (*Hierochloe odorata*); wild onion (*Allium* sp.); common yarrow (*Achillea millefolium*); yucca (*Yucca glauca*); and willow (*Salix* sp.) (Snell 2006).

3.10.4 Direct and Indirect Effects to Vegetation and Conservation Measures

Project construction activities that would include vegetation stripping would result in direct impacts to vegetation. The impact would be localized to where construction would occur, typically areas individually small in size (2-10 acres). The majority of these areas have been disturbed in the past (80-95 percent of the project area), specifically around existing structures needing rehabilitation/replacement (Phase 1) or within canal prisms and adjacent banks (Phase 2). Stripping of previously disturbed vegetation would be an impact short-term in nature; prompt reseeding and natural revegetation from adjacent vegetation and on-site propagules would restore the existing low quality perennial vegetation present in these areas. In contrast, an estimated 5-20 percent of the project area has native vegetation that may be potentially disturbed from project actions. Stripping of vegetation and soil disturbance in these areas would represent a long-term impact since restoration to a native community is difficult to achieve with typical reclamation and reseeding methods. These areas would include native areas where canals might be replaced by pipe, areas adjacent to access roads being repaired or constructed, potential land-leveling of native pastures, and new construction through native areas (Phases 2, 3, 5). These long-term impacts would be minimized by limiting new construction, as practicable, to areas that have previously been disturbed or cultivated. Where removal of native vegetation is unavoidable, reseeding with native seed mixes would be done in non-cropland areas. The Dunmore Bench development has the most potential to affect large areas of native vegetation. Although most of that area has also been previously cultivated, some native pastureland may be permanently converted to agricultural use.

Though several rare plant species have the potential to occur in the project area, the likelihood is low that they would be impacted by the project. If any rare plants were to occur, they would be present in natural or native habitats, whereas the majority of construction disturbance would occur in previously disturbed areas that that have low quality, often non-native, perennial vegetation. Wetland or riparian habitat that has formed within irrigation canals and ditches would not support the listed rare or sensitive plants which have specific habitat requirements. Pre-construction surveys within native communities targeted for new construction would be used to ensure rare plants would not be affected by the project.

Most culturally significant plants are common grassland or wetland plants, and no significant impacts would be anticipated from construction or operation of the project. Prior to site-specific construction, the Crow THPO would be consulted to identify any trees or other sites that may have cultural importance. Public concern has been raised regarding impacts to willow species along canals and laterals, which are currently used for sweat lodges. In the event that significant willow removals are identified as part of a specific CIP project, mitigation plantings of willow would be considered as compensation by IDT review.

3.10.5 Cumulative Effects to Vegetation and Land Cover

Past and present impacts to vegetation and land cover in the project area are primarily related to farming and agriculture. The majority of the project area acreage has been cultivated and thus permanently converted from natural land cover types and native vegetation communities. Aside from this project, there are no foreseeable future actions that would affect large acreages of land within the project area. The proposed project would potentially result in a small percentage of new lands being cultivated or irrigated that are currently native grassland. This would contribute to the cumulative acreage of converted native land cover; however, the majority of new development would be on lands already cultivated and thus no cumulative effects would occur.

3.11 WILDLIFE RESOURCES

The CIP system is in a rural setting with areas of natural habitat used by wildlife. Therefore an evaluation of the project's effects to habitat is warranted, particularly in relation to potential impacts to federally-protected species. The public also mentioned several wildlife species as possible considerations, including beavers, prairie dogs, and birds of prey. Evaluation of wildlife resources included resident and migratory species and habitats within the Reservation, specific to the project area when possible.

3.11.1 Wildlife Laws and Regulations

The ESA mandates protection of species federally listed as threatened or endangered and their associated habitats. All federal agencies must use their authorities to conserve listed species and ensure that their actions do not jeopardize the continued existence of listed species. Candidate species receive no statutory protection until they are listed as threatened or endangered under ESA.

The Reservation does not have an endangered species law different from the federal government, though it does grant protection to those species designated by the Crow Tribal Fish and Game Commission (CLOC 12-5-108). Additionally, the Crow Tribal Culture Department has a policy that animals used in religious rights and ceremonies or used as ceremonial food be protected from injury and extinction (Reed 2002). State-level wildlife regulations do not apply on the Reservation, however lists of Crow Tribal Fish and Game Commission designated species were not available. As a result, MFWP resources were utilized to obtain information on any rare or species of concern in the area.

Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-711), Executive Order 13186, and Crow tribal law (CLOC 12-7-110 and 111). The MBTA prohibits the taking, killing, possession, and transportation (among other actions) of migratory birds, their eggs, parts, and nests, except when permitted by regulations. EO 13186 requires all federal agencies support the conservation intent of migratory bird conventions and integrate bird conservation principles into their activities.

Bald and golden eagles are federally protected under the MBTA, the Bald and Golden Eagle Protection Act (BGEPA) and Crow tribal law (CLOC 12-7-110). The BGEPA prohibits anyone without a permit from taking bald or golden eagles, including their parts, nests, or eggs.

3.11.2 Overview of Existing Terrestrial Wildlife and Habitat

The project area occurs in agricultural cropland on relatively flat terraces along streams and rivers, with native grassland and sagebrush steppe on adjacent hills and slopes (Section 3.10). Though the majority of the project area is used for agriculture, many natural or semi-natural habitat features have been retained on field edges or along waterways that are used by a variety of wildlife species across the landscape. Agricultural lands also provide habitat depending on the season and species.

The rivers, streams and terraces of the project area would mainly be classified to the "Great Plains Riparian" ecological system. Typical wildlife in this system includes mink, beaver, turtles, frogs, and waterfowl (Vance et al. 2010). The Lodge Grass Storage Reservoir provides important habitat for nesting waterfowl and the filling of this reservoir is timed to accommodate nesting (HKM 2007). Adjacent grassland is primarily part of the "Great Plains Mixedgrass Prairie" ecological system, with typical wildlife including mule deer, coyote, pronghorn, prairie rattlesnake, barred tiger salamander, hawks, and grassland birds (Luna & Vance 2010). Several other ecological systems form inclusions or overlap with these systems that have many of the same wildlife species (see Project Record, Wildlife Analysis).

MFWP has identified geographic focus areas of wildlife habitat in need of conservation. Portions of the project area are part of two Tier 1 focus areas (i.e., greatest need of conservation) (MFWP 2005). The "Montana Sedimentary Plains" focus area includes the shrublands and mixed grass prairies on the hills adjacent to northern portions of the Bighorn and Little Bighorn River valleys. The "Powder River Basin/Breaks/Scoria Hills" focus area includes the rolling mixed-grass prairie and sagebrush grassland in the southeast portion of the project area along the Upper Little Bighorn River and Lodge Grass Creek. Montana Species of Concern are native animals breeding in the state that are considered to be "at risk" due to declining population trends, threats to their habitats, and/or restricted distribution. Several species of concern could potentially inhabit the project area (**Table 1**).

Table 3-12: Potentially Occurring Species of Concern in Project Area

Family	Species
Amphibians	Great Plains Toad
Reptiles	Milksnake, Snapping Turtle, Spiny Softshell, Western Hog-nosed Snake
Birds	Baird's Sparrow, Bald Eagle, Bobolink, Brewer's Sparrow, Burrowing Owl, Chestnut-collared Longspur, Clark's Nutcracker, Ferruginous Hawk, Golden Eagle, Grasshopper Sparrow, Loggerhead Shrike, Mountain Plover, Peregrine Falcon, Pinyon Jay, Sage Thrasher, Veery
Mammals	Black-tailed Prairie Dog, Merriam's Shrew, Pallid Bat, Swift Fox, Townsend's Big-eared Bat

Source: MFWP 2010

Migratory birds and bald and golden eagles migrate or reside in southeastern Montana, including the project area. Migratory birds pass through or breed and nest in Montana beginning as early as February 1st, but primarily from April 15th to July 15th. The bald eagle is a year round resident but also migrates regionally in Montana, preferring to nest in large trees or on cliffs in proximity to large, perennial water bodies (MFWP 2014b). Montana has a productive bald eagle population, increasing at a rate of about 10% per year. About 63 breeding territories were estimated in 2008 for the Bighorn Recovery Zone which includes the project area (Hammond 2010). Golden eagles are found year round throughout Montana. They prefer to nest on cliffs or in large trees, typically hunting in open prairie or sagebrush steppe (MFWP 2014c).

3.11.3 Federally-Listed Species

One federally-listed endangered species and two candidate species may occur in the project area (**Table 3-13**). The species list was most recently confirmed by the USFWS in May 2014.

Table 3-13: Threatened, Endangered and Candidate Species in the Vicinity of the Project Area

Species	Scientific Name	Status	Range in Montana
Black-footed ferret	*Mustela nigripes*	Endangered	Prairie dog complexes; Eastern Montana
Greater sage grouse	*Centrocercus urophasianus*	Candidate	Eastern, central and southwestern Montana in sagebrush, sagebrush-grasslands, and associated agricultural lands.
Sprague's pipit	*Anthus spragueii*	Candidate	Grassland habitats with little or no shrub cover east of the Continental Divide.

Source: USFWS 2013

Black-footed Ferret

Black-footed ferrets are intimately tied to prairie dogs (*Cynomys* sp.), which are their primary source of food and shelter (Hillman and Clark 1980). Throughout their range, they have only been found in association with large prairie dog complexes, and are therefore limited to the same open habitat: grasslands, steppe and shrub-steppe (Miller et al. 1996).

Black-footed ferrets have been extirpated from most of their former range, which included the project area. All known current populations are a result of the reintroduction of captive bred black-footed ferrets (Miller et al. 1996). No reintroductions have been attempted on the Crow Reservation, and the last sightings of ferrets within the project area were in 1923. There are prairie dog colonies within the Reservation, and several within the project area, however only one colony would be large enough to support an adult ferret (MNHP 2014). For further details refer to the Project Record, Biological Assessment.

Greater Sage Grouse

Greater sage-grouse occupy sagebrush habitat throughout eastern and southwestern Montana. Lek (term to refer to grouse displaying and dancing grounds) activity extends from March to May (Davis 1961). Nests are typically 0.2 to 6.5 miles from the lek (MFWP 2014d). Counts of males on leks during spring have been used to provide an index of relative size and trend of breeding populations of sage grouse in Montana since the 1950s. Statewide, sage grouse numbers increased from the mid-1960s through 1973 and fluctuated about that level until 1984. Sage grouse declined sharply statewide from 1991 through 1996 and increased through 2000 (Montana Sage Grouse Working Group 2005). No local or regional data on the status of sage grouse populations were available.

No confirmed leks are located within the project area, though there are several unconfirmed historical observations of sage grouse within the Bighorn irrigation unit north of Saint Xavier. Sage grouse core habitat areas have been identified approximately 9 miles southwest of the Pryor Creek Unit and 20 miles east of the easternmost edge of the project area (MNHP 2014). See the Project Record for further details (Biological Assessment).

Sprague's Pipit

Sprague's pipits are small sparrow-sized birds that are buff-colored, with a slender bill and prominent eyes. Suitable Sprague's pipit breeding habitat includes ungrazed or lightly grazed native, diverse mixed-grass prairie (i.e. unplowed) that is open and extensive with minimal woody cover nearby (Jones 2010). Sprague's pipit current and historical breeding range extends through north-central and eastern Montana. There have been no breeding records in southern and south-central counties since 1991 (Jones 2010). The majority of the project area is agricultural crop land, which is not suitable habitat for this species. Mixed grass prairie on uplands adjacent to the project area is hilly and merges with sagebrush steppe (Luna & Vance 2010). Sagebrush shrubs are common, which this species tends to avoid (Jones 2010). See the Project Record for further details (Biological Assessment).

3.11.4 Culturally Significant Wildlife

The Crow people consider many mammals and birds of the plains to be sacred, the most sacred being the American bison (Reed 2002), of which there are no longer free-roaming herds. Many other species important to the Tribe are common in the project area, including deer, badger, coyote, eagles, hawks, and other grassland birds. The Crow are also known for their large horse herds, a traditional symbol of wealth (Fandrich 2007).

3.11.5 Direct and Indirect Effects to Wildlife

The proposed project would have potential temporary and permanent effects to terrestrial wildlife, including migratory birds and eagles. Impacts during construction would include collision with construction vehicles causing injury or mortality, although these impacts are anticipated to be small and would not result in significant or population level impacts to wildlife populations or individual species. Project construction would also potentially cause displacement from habitat due to construction activity, noise, visual interference, or human presence. Displacement would be temporary, limited to the duration of each site-specific project, generally one or two reproductive seasons. However, depending on the species and the timing, displacement could cause increased exposure to predators and mortality, nest abandonment, decreased reproductive rates, interference with communication, or other behavioral or stress responses. Less mobile species (i.e. small mammals, amphibians, reptiles, ground-nesting birds) would be more likely to be directly impacted, whereas more mobile species (i.e. medium to large mammals, waterfowl and raptors) would be more likely to be displaced. Because the project is within an area where farming, recreation, and other regular and intermittent human uses occur, construction actions are similar to existing conditions from agriculture activities and unlikely to cause permanent, measureable declines to populations of any wildlife species of the area.

In the longer term, the project would potentially improve access to water sources for some wildlife by expanding the number of functional irrigation ditches in the project area or the creation of new water sources if Dunmore Bench were developed. On the other hand, rehabilitating irrigation ditches would also increase the drowning risks for wildlife attempting to cross fields or pastures, assuming no wildlife escape designs are incorporated. Another overall long-term positive effect of the project is that expected improvements in water quality due to reduced contamination or sedimentation of irrigation return waters (Section 3.3.6) would improve the quality of water sources for local and regional wildlife using the streams of the project area. These effects, while lasting, would impact low numbers of individuals of any one species, and would be unlikely to have any population-level effects.

Both temporary and permanent disturbance to wildlife habitat would occur from the project. Temporary disturbance would occur around existing structures, on banks adjacent to canals, and areas adjacent to roads by removing vegetation and excavating soils. These areas currently have natural or semi-natural vegetation communities that provide various degrees of habitat depending on the species. After construction, these areas would be reclaimed; vegetation would establish and provide habitat within one to three growing seasons. Permanent loss of habitat would occur if native grassland is converted to crop fields during phases 3 or 5 of the project. This would directly reduce the acreage of available grassland habitat on the landscape. However, most disturbances and land-leveling would be focused in areas previously disturbed or current farmland. The development of the new Dunmore Bench area would also potentially cause fragmentation of habitat through the construction of new irrigation canals and ditches.

Though several wildlife species of concern, including migratory birds, eagles, and culturally significant wildlife, have the potential to occur in the project area, there is low likelihood that population-level effects would result from project actions. No large numbers of wildlife are expected to be affected; and no significant adverse impacts are anticipated for any one species or species group. The majority of construction disturbances would occur in previously disturbed areas that do not provide critical habitat for any of these species. Pre-construction surveys would ensure no known nests or habitat necessary for any of these species would be affected by the project and timing limitations on construction would be implemented to minimize disturbance. Prior to site-specific construction, the Crow THPO would be consulted to identify any wildlife habitat that may have cultural importance.

Federally Protected Wildlife

The biological assessment concludes the proposed action will have no effect on black-footed ferrets.

3.11.6 Conservation Measures for Wildlife

The majority of project actions would occur within previously disturbed areas, areas with human infrastructure, along roads, and cultivated farmland, which minimizes the overall long-term impact of the project to wildlife and their habitat. Though no specific sensitive areas or habitat have been identified within the project footprint, pre-construction surveys would be done to detect critical habitat features on a site-specific basis. Examples include wetlands, prairie dog colonies, nest sites, etc. If critical or sensitive areas were found, those areas would be avoided as much as practicable.

Additional mitigation measures would be applied as part of the project to reduce potential impacts to wildlife (Section 2.3). Noise and traffic disturbance during construction would be controlled as much as possible. Construction vehicles would be confined to established roadways and all necessary precautions would be taken while moving or operating equipment. Appropriately-sized mufflers would be used on all vehicles. Construction or modification of powerlines would follow the techniques outlined by APLIC and the USFWS (APLIC 2012, USFWS 2005).

Migratory Birds

In order to fully comply with the MBTA and in good faith protect Montana bird species, all avoidance strategies recommended by the USFWS would be implemented to avoid impacts to migratory birds.

Typical strategies include timing limitations, removal of nesting habitat, and nesting surveys:

- Construction, or certain types of construction activities, would be avoided at sites with potential migratory bird nesting habitat during the nesting season (February 1 to July 15), depending on the species and site conditions.
- Potential nesting habitat would be cleared and grubbed prior to the spring nesting period, and maintained in that condition, to prevent nesting at the site during the season of construction.
- In areas not cleared prior to spring nesting, surveys for nesting birds would be done by qualified personnel within five days of construction. If nests are found, the USFWS would be notified for guidance on how to proceed.
- At any time during construction, if active nests are discovered, work would stop and the USFWS would be notified for guidance on how to proceed.

In order to reestablish bird habitat as much as practicable following construction, all non-cropland areas impacted by construction would be promptly reclaimed using approved seed mixes. By implementing these conservation measures, no impacts to migratory birds are expected to occur and only minor impacts to their habitat may occur during construction of the proposed project.

Eagles

The response of bald and golden eagles to human activities can be highly variable and is impacted by scope and proximity. The proposed project recommended measures for minimizing disturbances to eagles include seasonal restrictions as well as visual and distance buffers around nest, foraging and roost sites to minimize disturbance (MBEWG 2010). The recommended primary seasonal restriction is from approximately February 1 through August 15 for construction and maintenance within direct line-of-sight of an active nest. Eagles exhibit greater sensitivity to disturbance when activities occur within full view of the bird; therefore new construction would be limited to areas where visual buffers around nests can be retained. A distance buffer of 0.5 miles is recommended during construction of this project (USFWS Draft EA Comment 3-1, **Appendix B**). With implementation of these measures, no impacts to eagles are expected.

3.11.7 Cumulative Effects to Wildlife

The project would have temporary and localized impacts to wildlife and terrestrial habitat that are not expected to result in measureable, population-level effects. With the implementation of conservation measures to further minimize potential effects, the project would not incrementally contribute to cumulative effects on wildlife from other past, present, and reasonably foreseeable future actions.

3.12 AIR QUALITY

An evaluation of temporary reductions in air quality due to construction activities from the project is necessary to ensure no impacts occur to local residents. The analysis of air quality is limited by the availability of data from the nearest air monitoring stations.

3.12.1 Air Quality Regulations

The EPA regulates air quality on the Reservation through implementation of the federal Clean Air Act (CAA). The EPA established National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect the public from the health hazards associated with air pollution. These six criteria pollutants are

carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter of two sizes [less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$)], and lead (Pb).

3.12.2 Current Air Shed and Air Quality

The project area is designated as a Class II attainment area for federal air quality standards, which is an air quality jurisdiction subject to more stringent limits than NAAQS. The MTDEQ operates a network of monitoring stations around the state that continuously measure pollutions levels; none are within the boundaries of the Reservation. The nearest monitoring stations upwind of the project area are in the city of Billings, approximately 40 miles west of the city of Hardin (Air Quality Station #30-111-0066 and #30-111-0085). In general, air quality at these stations is good; the average air monitoring measurements have been below NAAQS for criteria pollutants (MTDEQ 2013). Although individual maximum measurements at one of these stations (#30-111-0066) exceed federal standards for sulfur dioxide, a violation of air quality standards occurs only if the annual arithmetic mean concentration for a calendar year exceeds the standard (MTDEQ 2013).

Montana has thirteen non-attainment areas (MTDEQ 2011). The EPA designates a nonattainment area for a specific pollutant that does not meet federal air quality standards. Historically, the city of Billings was the nearest nonattainment area to the project area because of excess sulfur dioxide (SO_2) emissions. The EPA mandated that the State of Montana develop a State Implementation Plan (SIP) to outline specific measures to reduce SO2 concentrations to meet state and federal standards. Currently, the city of Billings emits 20,000 tons of SO2 per year, which is under the 36,000 tons allowed by the SIP (MTDEQ 2011).

The CAA mandates that particular areas of national significance have more stringent air quality standards. Referred to as Class I attainment areas, these areas include national parks greater than 6,000 acres, national monuments, national seashores, and federal wilderness areas larger than 5,000 acres designated prior to 1977. The nearest Class I attainment area (non-mandatory) in Montana is the Northern Cheyenne Reservation, which shares a portion of the east border of the Crow Reservation, about 20 miles from the nearest point of the project area. The nearest mandatory Class I area in Montana is the Yellowstone National Park about 60 miles southwest from the nearest point of the project area.

3.12.3 Direct and Indirect Effects to Air Quality and Conservation Measures

The project would result in temporary, intermittent releases in fugitive emissions of particulate matter less than 10 microns in diameter (PM_{10}) and carbon dioxide (CO). Sources would include engine exhaust, which would occur during construction activities and from windblown dust generated from truck and vehicle traffic. Road dust during construction would be controlled as needed by enforcing speed limits and watering the road or using other non-hazardous dust control materials during dry conditions. The selected contractor would also be required to maintain equipment exhaust systems to factory or better specifications to minimize emissions and noise. Additional dust and pollution control measures would be implemented as determined by BMPs and a site-specific SWPPP, as required. Any complaints from local residents related to air quality issues would be dealt with promptly. These practices would limit emissions to the immediate project area.

The operation of an irrigation project does not include sources that emit criteria pollutants, and therefore emissions from the project would not occur. Based on existing air quality in the region, the control of temporary fugitive emissions during construction, in concert with federal emissions controls, the proposed project would not lead to measureable increases in criteria pollutants.

3.12.4 Cumulative Effects to Air Quality

The project would have no measurable impacts to air quality in the project area and therefore would not contribute to cumulative effects on air quality from other past, present, and reasonably foreseeable future actions.

3.13 CLIMATE CHANGE

Changes in precipitation patterns from climate change could affect river flows and operation of storage reservoirs which provide irrigation water to the project's individual units. Improving the efficiency of the irrigation system should improve the options for adjusting to future climate change scenarios that increase or extend dry periods.

U.S. Department of the Interior Secretarial Order No. 3289 requires Reclamation to "consider and analyze potential climate change impacts when undertaking long-range planning exercises (USDOI 2009). Climate change is analyzed in two ways: 1) how climate change may be affected by the proposed project and 2) how the proposed project may be affected by climate change.

It is important to note that climate change projections have geographic and temporal variation (Reclamation 2011). Climate studies and models are an amalgamation of various climate-related data, resulting in a generalized average of climatic variables. As such, each of these variables carries with it an inherent uncertainty. This uncertainty tends to increase with time; estimates of climate projected out 100 years have a lower confidence than projections for the next 10-20 years. Even with this uncertainty, climate studies and models provide a functional planning tool to evaluate potential future activities.

3.13.1 Current Climate of Region

Climate within the project area is semi-arid (Reclamation 2013). Average annual temperatures measured at Hardin range from 8 – 33 degrees Fahrenheit in January to 56-90 degrees in July. Precipitation averages 11.9 inches annually, with annual snowfall averaging approximately 21.7 inches (Western Regional Climate Center 2014).

3.13.2 Current Contributors to Climate Change

Intergovernmental Panel on Climate Change (IPCC) scientists and experts conclude that most of the observed changes in climate are very likely due to observed increases in anthropogenic greenhouse gas (GHG) concentrations, which trap heat in the atmosphere (IPCC 2007). Carbon dioxide is an example of a GHG that occurs naturally and is emitted to the atmosphere through natural processes and human activities. Other GHGs are synthesized and emitted solely through human activities (e.g., fluorinated gases). The principal GHGs identified by the EPA that enter the atmosphere because of human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases. CO_2 is the primary

GHG emitted through human activities. The EPA collects data on and encourages limiting or reducing emissions of anthropogenic sources of GHGs to the earth's atmosphere (USEPA 2013).

In 2005, the State of Montana accounted for approximately 0.6% of total GHG emissions in the US (Montana CCAC 2007). However, Montana has a higher per capita intensity of GHG emissions compared to the national average. This is due to the strong fossil fuel production industry, large agricultural industry, large distances for transportation, and low population base. No data is available for current emissions on a project area-specific or regional basis. However, the contributors to emissions that pertain to the project area, which include agricultural emissions from methane and nitrous oxide due to manure management, fertilizer, and livestock, accounted for 26% of statewide emissions. Fossil fuel production in the natural gas, oil products, and coal industries, which occurs near the project area in Billings, accounted for 11% of the state's emissions.

3.13.3 Effects of Project on Climate Change

Temporary direct emissions of GHGs would occur during project construction. Combustion emissions would include SO_2, NO_2, CO, volatile organic compounds (VOCs), and greenhouse gases (GHGs) from engine exhaust. These emissions would be temporary during the construction period, and would not be significantly above ambient emissions within the project area.

Purchase of non-tribal land (Phase 4) and development of the Dunmore Bench (Phase 5) would increase the amount of agricultural land within the CIP, but since most of this land is currently agricultural, GHG emissions would not increase from current levels. Converting non-agricultural land to agricultural use would result in an increase of GHG emissions, primarily from fertilizer application and management. Conversely, the repair and rehabilitation of the CIP would enable farmers to use the land more effectively with an enhanced irrigation network. Statewide agricultural emissions have been relatively stable over the past decade (CCAC 2007). Development of the proposed project would not result in significant changes to agricultural production statewide. In addition, there has been an agricultural trend statewide toward conservation tillage/no till, which has been shown to act as a carbon sink compared to conventional tillage, reducing overall GHG emissions. Therefore, the proposed project would not result in significant emissions of GHGs, and therefore would not result in significant negative effects to climate change.

3.13.4 Effects of Climate Change on the Project

Within the Great Plains Region, temperature appears to have warmed since the beginning of the 20th century, and may increase steadily during the 21st century (Reclamation 2013; Reclamation 2011). Warmer temperatures could lead to increased evapotranspiration rates, resulting in increased water usage for agriculture. However, the most significant effect of warmer temperatures on the proposed project would be changes in precipitation regimes, which could affect the potential water available for irrigation.

Modeling changes in hydrologic regimes are sensitive to the location and the period of analysis. Within the Missouri River Basin, historical trends appear to show that precipitation has increased. In contrast, a study conducted in eastern Montana and western North Dakota indicates that precipitation has actually decreased. This inconsistency likely results from the relative size of the basins being analyzed (Reclamation 2011). Therefore, predictions for hydrologic changes in the project area are evaluated

generally within the region for this EA, as specific studies in the project area are limited, and may result in inaccurate conclusions. It is assumed that variability in precipitation and temperature would still occur on an annual basis.

Across the Missouri River Basin, temperature and hydraulic regime changes are expected to affect hydrology most by influencing snowpack development. Typically, peak runoff occurs twice during the year. The first peak in runoff occurs in early spring supplied by lowland snowmelt. The second is a major peak during early summer supplied by mountain snowmelt. This is significant to the project area because, with precipitation being equal, warmer temperatures could cause reduced snowpack development during the winter, more runoff during the winter season, and earlier spring peak flows associated with winter snowmelt (Reclamation 2013). Potential precipitation increases or decreases would offset or amplify this effect. This could result in significant effects to future water supplies and thus how the proposed project operates and the extent of farmland that could be irrigated.
In general, models and studies appear to indicate that precipitation will increase throughout the Missouri River Basin due to warming (Reclamation 2013). However, timing of water availability for irrigation would change. Warming may result in more winter runoff to manage. Under current system and operating conditions, this runoff would lead to reduced water supplies because of deficiencies in water storage. During the winter runoff season, storage opportunities are limited by flood control considerations. Increased winter runoff would not necessarily translate into increased storage of water. Conversely, storage capture of snowmelt generally occurs during late spring and early summer seasons. Reductions in runoff during this season would likely translate to reductions in storage capture and subsequent reductions in water supply during warm season delivery (Reclamation 2013).

Within the project area, the Bighorn River would be less sensitive to increased spring runoff and decreased summer flows compared to the Little Bighorn River and Pryor Creek. The Yellowtail Dam provides a reliable source of water throughout the growing season; changes in runoff would not likely result in modification of current irrigation practices on the Bighorn River. Conversely, no reservoirs are present on Pryor Creek and only one relatively small storage reservoir (Lodge Grass) exists within the Little Bighorn River drainage, and therefore they are more dependent on natural precipitation regimes. If there is a subsequent decrease in summer flows, there would be less water available for current irrigation practices.

A primary purpose of the proposed project is to increase water use efficiency throughout the CIP. Increasing the system's efficiency would likely help to offset negative effects from changes in water availability due to climate change. Therefore, a minor decrease in water availability as a result of shifting spring runoff would not likely result in significant operational changes to the proposed project. If major decreases in water availability were to occur, there could be significant effects to the irrigated lands of the CIP. These effects would occur whether the project is implemented or not, and increases in efficiency from the project would only help to offset those effects.

3.13.5 Cumulative Effects Relating to Climate

The project would not result in net increases in GHG emissions and therefore would not contribute to climate change. The project is expected to provide greater ability to respond to the anticipated results of climate change for the project, such as changes in water availability.

3.14 PALEONTOLOGICAL RESOURCES

The 2010 Paleontological Resources Preservation Act does not apply on Reservation lands; however, paleontological resources on the Reservation are treated as a trust asset because of their potential commercial value. Since the project involves soil-disturbing activities, there is potential for encountering paleontological materials during construction actions. However, the project area is in river or stream valleys with mostly alluvial sediments that are not fossiliferous, categorized as having "low fossil potential" (BLM 2011). Therefore the likelihood of disturbing fossils is low. No direct, indirect, or cumulative impacts are expected.

3.15 FLOODPLAINS

Floodplains can be defined as an area of low-lying ground adjacent to a river, formed mainly of river sediments and subject to inundation by floodwaters from any source (FEMA 2012). Nearly all of the project area is presumed to be within floodplains. Though the majority of the Reservation has not been zoned by FEMA, adjacent portions of Bighorn County with similar topography have been mapped, as well as the city of Lodge Grass. In those adjacent portions, the flat area along the Bighorn and Little Bighorn Rivers and their larger tributaries have been designated Zone A 100-year flood zones. Smaller tributaries and upland areas are designated Zone C, areas of minimal flooding (Project Record, Floodplain Analyses; FEMA 2014). Within the project area, 100-year flood zones presumably occur along all the major streams used for irrigation, though portions of the irrigation units on relatively higher ground or slopes may be outside of that zone.

Project actions would not result in any changes in flood zone designations. Potential reductions in the quantity of surface water moving within the irrigation system due to more efficient water use would increase the amount of water available for instream flow, assuming diversions are adjusted accordingly during CIP operations. Though the increase in instream flow may be measureable, it is unlikely to be a large enough increase to affect flooding or floodplains. Furthermore, these increases would occur during the irrigation season in mid to late summer, which is discrete timing from when most flooding events occur in the spring to early summer. Therefore no short-term, long-term, or cumulative effects to flooding regimes and thus, adjacent floodplains, are expected to occur due to project actions.

3.16 SUMMARY COMPARISON MATRIX

Table 3-14 summarizes the major impacts, both beneficial and adverse, that would potentially result to key resources from each phase of the project, as compared to the existing condition of each resource.

Table 3-14: Summary of Potential Impacts of Five Project Phases on Key Issues

Key Issue	Phase 1 Rehabilitation/ Replacement of CIP Structures	Phase 2 Rehabilitation of CIP Canals and Laterals	Phase 3 Alternative On-Farm Irrigation Systems	Phase 4 Crow Tribe Purchase of Non-Tribal Lands	Phase 5 Development of Dunmore Bench
Soil Conservation	Measurable decrease in sediment release and transport from irrigation system into streams in the long-term.	Measurable decrease in sediment release and transport from irrigation system into streams in the long-term.	Measurable decrease in sediment release and transport from irrigation system into streams in the long-term.	N/A	Limited conversion of native soils to agricultural use.

Key Issue	Phase 1 Rehabilitation/ Replacement of CIP Structures	Phase 2 Rehabilitation of CIP Canals and Laterals	Phase 3 Alternative On-Farm Irrigation Systems	Phase 4 Crow Tribe Purchase of Non-Tribal Lands	Phase 5 Development of Dunmore Bench
Water Quality	Measureable improvements in quality in irrigation returns/streams in the long-term.	Measureable improvements in quality in irrigation returns/streams in the long-term.	Measureable improvements in quality in irrigation returns/streams in the long-term.	N/A	Negligible reductions in water quality from irrigation of additional lands.
Water Quantity	Increase in water use efficiency between 20-30% (in combination with Phase 2). More water available for irrigation or amount diverted could be reduced.	Increase in water use efficiency between 20-30% (in combination with Phase 1). More water available for irrigation or amount diverted could be reduced.	Further measurable increase in water use efficiency. More water available for irrigation or amount diverted could be reduced.	N/A	No net change. Additional water could be released from Yellowtail Dam to support new development.
Wetlands	No net loss in acreage. Wetlands hydrologically connected to canal reaches controlled by affected structures may be reduced in size or cut off; compensation measures would be used.	No net loss in acreage. Wetlands hydrologically connected to affected canal reaches may be reduced in size or cut off; compensation measures would be used.	No net loss in acreage. Wetlands hydrologically connected to or within affected farmland may be reduced in size or cut off; compensation measures would be used.	N/A	Potential net gain in acreage. Wetlands hydrologically connected to or within affected farmland may be reduced or cut off; compensation measures would be used. Measurable increase in artificial wetland acreage from canal construction.
Noxious Weeds	Minimal spread. If noxious weeds are present, conservation measures would reduce opportunities for spread.	Minimal spread. If noxious weeds are present, conservation measures would reduce opportunities for spread.	Minimal spread. If noxious weeds are present, conservation measures would reduce opportunities for spread.	N/A	Minimal spread. If noxious weeds are present, conservation measures would reduce opportunities for spread.
Fisheries	Long-term benefits from improvements in water quality and reduction in the quantity of water diverted.	Long-term benefits from improvements in water quality and reduction the quantity of water diverted.	Long-term benefits from improvements in water quality and reduction the quantity of water diverted.	N/A	No impact. More water would be released from Yellowtail Dam to support new development.
Socio-economics	Positive economic impacts to individual CIP users/farmers, the Tribe, and local businesses through increased revenue.	Positive economic impacts to individual CIP users/farmers, the Tribe, and local businesses through increased revenue.	Positive economic impacts to individual CIP users/farmers, the Tribe, and local businesses through increased revenue.	Positive economic impacts to the Tribe through increased revenues in agriculture.	Positive economic impacts to the Tribe through increased revenues in agriculture.

Key Issue	Phase 1 Rehabilitation/ Replacement of CIP Structures	Phase 2 Rehabilitation of CIP Canals and Laterals	Phase 3 Alternative On-Farm Irrigation Systems	Phase 4 Crow Tribe Purchase of Non-Tribal Lands	Phase 5 Development of Dunmore Bench
Trust Benefits	Long-term, positive economic impacts to the Tribe and its members from revenues on trust lands.	Long-term, positive economic impacts to the Tribe and its members from revenues on trust lands.	Long-term, positive economic impacts to the Tribe and its members from revenues on trust lands.	Long-term, positive economic impacts to the Tribe and its members from additional revenue generated from new tribal lands.	Long-term, positive economic impacts to the Tribe and its members from additional revenue generated from new tribal lands.
Cultural Resources	Permanent loss of historical structure types would be compensated through detailed documentation.	No impacts anticipated.	No impacts anticipated.	N/A	No impacts anticipated.

4.0 List of Preparers

The efforts of an interdisciplinary team comprising experts and technicians in various fields were required to complete this study (**Table 4-1**).

Table 4-1: List of Preparers

Affiliation	Name	Title	Project Role	Years of Experience
Bureau of Reclamation	Vernon LaFontaine	Natural Resource Specialist	Project leader, development and coordination, contributing author	34
	Christina Lasater	Environmental Specialist	Coordination of ESA informal consultation, Content review	7
	Dan Stremcha	Project Engineer and Coordinator	Engineering review	25
	Brad Coutant	Archaeologist	Paleontological review	27
	Bryce Blackley	Civil Engineer	Engineering review	25
Bureau of Indian Affairs	Melissa Passes	Regional Environmental Specialist	Environmental review	15
	Justin Moschelle	Archaeologist	Heritage review	10
Crow Tribal Water Resource Department	Titus Takes Gun	Director	Coordination	6
	Danetta Half Holds	IT Specialist	Scoping Coordination	10
	Myron Shield, Jr.	GIS Specialist	GIS Data and Mapping	6
Bartlett & West	Colin Nygaard, P.E.	Project Manager	Project Management and Coordination	8
	Leif Sande	Senior Project Engineer	Project Design	4
	Chris Maus	Project Engineer	Scoping Coordination	1.5
	Xuejiao Rich	GIS Specialist	Map Production	1.5
Wenck Associates, Inc.	John Schulz	Wildlife Biologist	EA project development and coordination	20
	Sara Simmers	Natural Resource Specialist, Botanist	Document coordination, Principal author	7
	Luke Toso	Natural Resource Specialist, Botanist	Contributing author, Water Resources, Wetlands, Vegetation, Climate change	3
	Dan Ackerman	Wildlife Biologist, Natural Resource Specialist	Threatened and Endangered Species, Wetlands, Floodplains	7

Affiliation	Name	Title	Project Role	Years of Experience
Wenck Associates, Inc., cont'd	Chris Knodel	Environmental Engineer	Water Quality, Climate Change	10
	Amy Denz	Environmental Scientist	Socioeconomics, Environmental Justice	17
	Cindy Robb	Environmental Compliance Manager	Air Quality	15
	Jesse Beckers	Natural Resource Specialist	Wildlife, Fisheries, Technical Assistance	1
	Justin Askim	Wildlife Biologist/ Natural Resource Specialist	Soils, Maps, GIS Analysis	6
	Andrew Rehmann	Environmental Scientist	Wildlife, Fisheries, Invasive Species, Technical assistance	3
	Susan Nelson	Biologist, Botanist	Technical assistance	7
	Jeff Madejczyk	Environmental Scientist	Quality control/Quality assurance	15

5.0 Consultation and Coordination

This chapter summarizes the involvement of the public, the Tribe, and government agencies during the development of the EA.

5.1 SCOPING & PUBLIC INVOLVEMENT

Public involvement and agency coordination are required as part of the NEPA process, to the extent practicable (40 C.F.R. §§ 1501.4(b), 1506.6(b)). Involvement begins with scoping to help determine the relevant issues for analysis in the EA. For this project, public scoping activities included mailings, website development, community notices, and three public input meetings. A separate mailing was sent to government entities and one agency meeting was held. The scoping period officially closed February 28, 2014.

Two mailings were sent to inform the public about the proposed project and provide notice of upcoming public meetings. A Scoping/Solicitation of View letter was mailed on January 17, 2014, to a total of 1,004 project area landowners with addresses off-Reservation or out-of-state (list included in Project Record). Landowners living in the local area were informed via several community notices described below. The same letter was emailed January 21, 2014 to two (2) local organizations with known concerns over the Bighorn River. A separate letter was mailed January 22, 2014 to a total of twenty-seven (27) federal, state, and local government agencies or entities. Copies of the mailing materials are included in **Appendix A**.

A project website, hosted on Reclamation's website, was developed to inform the public about the proposed project, provide updates about public meetings and progression of the environmental documents, to give background on the regulatory and NEPA process, and to provide an online comment form. The website was activated January 22, 2014. Screenshots of the website are included in the Project Record.

Community notices included newspaper notices, posters, and flyers, which informed the public of upcoming public meetings and the timeline for the scoping comment period. A newspaper legal notice was published on February 1, 2014 in the Billings Gazette (p. D3). Posters were placed at six post office locations in the Reservation communities of Crow Agency, Fort Smith, Lodge Grass, Garryowen, St. Xavier, and Pryor. Flyers accompanied the posters, allowing interested persons to take information with them if desired. Copies of these materials are available in the Project Record.

Three (3) public input meetings and one (1) agency meeting were held in February 2014 to solicit interaction and comments from the public regarding key issues. The public meetings were held February 3 in Wyola, February 4 in Crow Agency, and February 5 in Billings, all from 6-9 pm. The agency meeting was held February 5 in Billings from 12-3 pm. The meetings were an open house format. A slideshow presentation was provided by the project team consultants, which provided an overview of the proposed project, a brief overview of issues, and a general summary of the environmental review process. Maps and photos of the project were displayed. Meeting attendance and other handouts provided at the meetings are recorded in the Project Record.

All public comments received during the scoping period are included in the Project Record. Comments and the rationale for issue determinations are summarized in **Appendix A**. Verbal comments during the public meetings are also included. In general, there was public concern over impacts to water quality and fisheries in the Bighorn River, socioeconomic consequences, and tribal benefits. Reclamation used these comments, along with other interagency and interdisciplinary discussion, to identify the set of key issues to analyze in depth, listed in Section 1.6.2. Other potentially relevant resources that were determined not to be key issues are listed in the Project Record along with the rationale for why they were determined not to be pertinent.

5.2 TRIBAL AND AGENCY COORDINATION

5.2.1 Tribal Consultation

Reclamation has a government-to-government relationship with federally-recognized tribes. This unique relationship is affirmed in treaties, Supreme Court decisions, and Executive Orders, and provides that Reclamation and other federal agencies consult with tribes regarding policy and regulatory matters. Executive Order 13175 (2000) sets forth the criteria agencies should follow when formulating and implementing policies and also requires establishment of a consultation process for interactions with Indian tribes in the development of regulatory policies that have tribal implications. Section 106 of the NHPA also requires Reclamation to consult with tribes for undertakings that may affect properties considered to have traditional religious and cultural significance.

The Crow Tribe and Reclamation entered into an agreement (638 Contract) to cooperatively plan and review the proposed project. For all practical purposes, the Tribe, Reclamation, and Bureau of Indian Affairs have participated in NEPA activities as cooperating agencies.

Planning, reviews, and consultations have been coordinated by the Interdisciplinary team and through the Project Management Committee. The Draft EA prepared by the Tribe's consultants is a product of inter-agency consultation and public participation.

5.2.2 Federal and State Agency Consultation

In addition to the scoping process, several federal agencies provided information or assistance in preparing this EA related to federal laws and regulations: Reclamation (lead agency, federal trust land); BIA (cooperating agency, federal trust land); U.S. Fish and Wildlife Service (Section 7 Consultation under ESA); USACE (Section 404 permit); and U.S. EPA (Section 401 permit and NPDES permit). The Project Record includes copies of all correspondence with these agencies.

5.3 DRAFT EA DISTRIBUTION

As part of the CEQ Regulations on the NEPA, Reclamation has circulated the Draft EA to agencies, organizations, and individuals that have contributed information on the project or inquired about the project. The Draft EA was also available for download from the project website. Comments on the Draft EA were accepted between October 17, 2014 through November 21, 2014 (a minimum of 30 calendar days).

5.3.1 Distribution List

The distribution list for the Draft EA is included in **Appendix B**.

5.3.2 Draft EA Comments/Responses

Draft EA comments and responses are summarized in **Appendix B**. Copies of all responses are included in the Project Record.

5.4 REGULATIONS, AUTHORIZATIONS, & APPROVALS

The proposed project would comply with the following federal statutes and orders as well as state statutes pertaining to the Bighorn River. The relevance of these laws to the project is explained under individual resource discussions and analysis (Chapter 3). All required permits and necessary authorizations would be obtained prior to construction (Chapter 1, **Table 1-1**). Construction of the project would also require that easements and ROW permits be obtained for crossings of tribal lands.

5.4.1 Federal

- American Indian Religious Freedom Act (P.L. 95-341)
- Archaeological Resources Protection Act of 1979 (P.L. 96-95)
- Archaeological and Historic Preservation Act (AHPA) of 1974 (P.L. 93-291)
- Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (Federal Register, Vol. 48, No.190, 1983, pp. 44716 to 44740)
- Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250)
- Clean Air Act (42 U.S.C. §§ 7401-7671q) and Amendments of 1970
- Clean Water Act (33 U.S.C. 1251 et seq.)
- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (P.L. 96-510)
- Endangered Species Act of 1973 (P.L. 93-205), 16 U.S.C. Sections 1531-1544
- Executive Order 11593, 1971 (Protection and Enhancement of the Cultural Environment) (16 USC 470)
- Executive Order 11988 (Floodplain Management, 1977)
- Executive Order 11990 (Protection of Wetlands, 1977)
- Executive Order 12898 (Environmental Justice, 1994)
- Executive Order 13112 (Invasive Species Control, 1999)
- Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds, 2001)
- Farmland Protection Policy Act of 1981
- Federal Water Protection Recreation Act of 1965 (P.L. 89-72)
- Fish and Wildlife Coordination Act (FWCA)of 1958 (P.L. 85-624, as amended, and 40 CFR 1502.25)
- Indian Trust Policy (July 2, 1993)
- Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-711),

- National Historic Preservation Act (NHPA) of 1966, as amended through 1992 (P.L. 89-665 and P.L. 96-515)
- National Invasive Species Act (NISA) of 1996
- Native American Graves Protection and Repatriation Act of 1990 (25 USC 3001 et seq.) and 43 CFR Part 10 – Native American Graves Protection and Repatriation Act Regulations
- Paleontological Resources Preservation Act of 2010
- Rivers and Harbors Act of 1890, Section 10 Permit
- 36 CFR 60.4 – National Register Criteria
- 36 CFR 79 – Curation of Federally Owned and Administered Archeological Collections
- National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd-668ee (Refuge Administration Act)

5.4.2 State

These state laws would potentially apply to resources within the banks of the Bighorn River pursuant to the ruling from *Montana v. United States*, 450 U.S. 544 (1981).

- Montana Water Quality Act (Title 75, Ch. 5)
- Montana Stream Protection Act (SPA 124 Permit)
- Montana Natural Streambed and Land Preservation Act (310 Permit)
- Short-term Water Quality Standard for Turbidity (318 Authorization)
- Montana Floodplain and Floodway Management Act
- Montana Land-Use License or Easement on Navigable Waters

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7.0 Abbreviations & Acronyms

AAQM	Ambient Air Quality Monitoring
AFA	Annual Financial Agreement
AFY	acre-feet per year
AHPA	Archaeological and Historic Preservation Act
BIA	Bureau of Indian Affairs
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMPs	Best Management Practices
CAA	Clean Air Act
cfs	cubic feet per second
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CIP	Crow Irrigation Project
CWA	Clean Water Act
EA	Environmental Assessment
EC	Electrical Conductivity
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FSA	Farm Service Agency
FWCA	Fish and Wildlife Coordination Act
GHG	Greenhouse Gas
HUC	Hydrologic Unit Code
IDT	Interdisciplinary Team
ITA	Indian Trust Asset
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
MR&I	Municipal, Rural, and Industrial
MNHP	Montana Natural Heritage Program
MTDA	Montana Department of Agriculture
MTDEQ	Montana Department of Environmental Quality
MFWP	Montana Fish, Wildlife, and Parks
N/A	Not Applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NISA	National Invasive Species Act
NO_2	Nitrogen Dioxide
NPDES	National Pollution Discharge Elimination System

NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSC	National Safety Council
NWI	National Wetland Inventory
O_3	Ozone
OSHA	Occupational Safety & Health Administration
PA	Presently Assessable
Pb	Lead
PEMC	Palustrine Emergent Seasonally Flooded
P.L.	Public Law
PM	Particulate Matter
RCRA	Resources Conservation and Recovery Act
ROW	Right-of-way
SLLMP	Streamflow and Lake Level Management Plan
SO_2	Sulfur Dioxide
SPCC	Spill Prevention Containment and Countermeasures
SWPPP	Storm Water Pollution Prevention Plan
TERO	Tribal Employment Rights Office
TDS	Total Dissolved Solids
THPO	Tribal Historic Preservation Officer
TNA	Temporarily non-assessable
USACE	United States Army Corps of Engineers
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Appendix A

Scoping Letter to General Public
Scoping Letter to Agencies and Mailing List
Summary of Public Scoping Comments

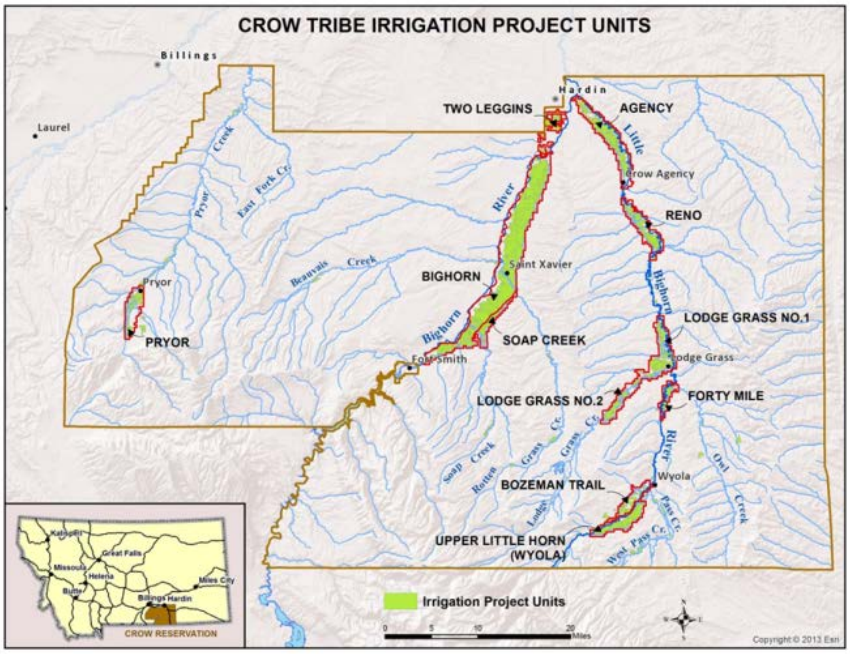
January 17, 2014

RE: Scoping and Solicitation of Views – Crow Irrigation Project (CIP) Rehabilitation and Improvement

Dear Interested Party:

This letter is to notify you of proposed rehabilitation and improvement work on the Crow Irrigation Project (CIP) on the Crow Indian Reservation, Montana. The authorization of this work is a component of the historic Crow Tribe Water Rights Settlement Act (the Act) of 2010 (P.L. 111-291). The Act authorizes funds for repairs and maintenance of CIP infrastructure, as well as for operational improvements.

During the early 1900s the CIP was built with federal funding and provided water to irrigate farmlands along the Bighorn River, Little Bighorn River, Pryor Creek, and Lodge Grass Creek. The CIP is managed by the Bureau of Indian Affairs and serves both tribal and non-tribal farmers, currently within eleven irrigation units: Bighorn, Agency, Forty Mile, Reno, Lodge Grass #1, Lodge Grass #2, Bozeman Trail, Upper Little Horn (Wyola), Pryor, Soap Creek, and Two Leggins Units (see figure at right). Approximately 320 miles of project canals divert and carry stream waters to farm fields during the months of April-September. The CIP is composed of approximately 3,800 structures.



Currently, many of the irrigation facilities are beyond their service life and in need of major repair. Other facilities are operating at reduced efficiency or capacity and result in shortages to some lands or are no longer capable of serving lands irrigated in the past. There is a need to implement the rehabilitation and improvement work for mutual benefits to the existing users and address opportunities for future tribal uses. The Crow Tribe has hired Bartlett & West, a professional engineering firm, to develop a master plan for CIP repair work and to provide designs for the rehabilitation and improvement of the CIP.

The Bureau of Reclamation is providing federal oversight of construction funding, reviewing engineering plans, and serving as the lead agency for preparation of an Environmental Assessment (EA) under the National Environmental Policy Act of 1969 (NEPA). Because the project will be implemented in stages over a 10-15 year timeframe, the EA will be programmatic in nature. The programmatic EA will analyze general project work activities and identify project-wide conservation measures for water quality, rivers and streams, wildlife, fisheries, cultural, and other resources. Site-specific review and compliance for each phase of work will be completed when final detailed plans are available. For more information please visit the project website at: http://www.usbr.gov/gp/nepa/cip/index.html.

Your input is being requested. Specifically, we are interested in resources that might be impacted and mitigation/ conservation measures pertaining to those impacts. Comments are most valuable if they are specific to the proposed action and include supporting reasons for us to consider in the EA.

Please note that the project has been authorized; therefore comments regarding the approval or refutation of the project will be disregarded. Comments should be focused on environmental/resource issues.

For your input to be considered in preparing the Draft EA, we request comments by February 28, 2014. Comments may be submitted in the following ways:

- Online at the project website: http://www.usbr.gov/gp/nepa/cip/index.html
- By mail:
  Bureau of Reclamation
  Attn: Crow Water Projects (GP-4000)
  P.O. Box 36900
  Billings, MT 59107-6900
- By email to a listed project contact:

Bureau of Reclamation:		**Crow Nation:**
Environmental Review	*Engineering and Design*	*Crow Tribe Water Resource Dept.*
Vernon LaFontaine (main contact)	Dan Stremcha	Titus Takes Gun, Director
406-247-7720	406-247-7832	406-638-4235
vlafontaine@usbr.gov	dstremcha@usbr.gov	Titus.TakesGun@crow-nsn.gov

- In writing at a public open house meeting:
  - February 3rd, 6-9 PM, Wyola District Hall, I-90 south (Frontage Rd.), Turn on Little Horn Rd.
  - February 4th, 6-9 PM, Crow Agency, Multi-Purpose Building on the corner of Multi-Purpose Road and Heritage Road off of Bala Street
  - February 5th, 6-9 PM, Billings, Crow Tribe Sub-Office, 711 Central Avenue, Suites 204 & 206

If you have any questions, or need more information about the project, please contact those listed above or attend a public open house.

Sincerely,

Titus Takes Gun, CTWRD Director

United States Department of the Interior

BUREAU OF RECLAMATION
Great Plains Regional Office
P.O. Box 36900
Billings, MT 59107-6900

IN REPLY REFER TO:
GP-4200
ENV–6.00

JAN 16 2014

Interested Parties

Subject: Rehabilitation and Improvement of Crow Irrigation Project, Crow Indian Reservation

The Bureau of Reclamation, the Crow Tribe, and the Bureau of Indian Affairs (BIA) are cooperatively hosting open houses for the public and interested agencies to become involved in and comment on an environmental review of the Rehabilitation and Improvement of the Crow Irrigation Project (CIP) in southcentral Montana. Reclamation is leading the review of the project under the National Environmental Policy Act of 1969.

The Crow Tribe has hired Bartlett & West to prepare an Environmental Assessment (EA) in conjunction with the CIP engineering master plan. Potential conservation measures for the project would address water quality, rivers and streams, wetlands, soils, wildlife, fisheries, cultural, and other resources.

An open house meeting for agencies will be held in Billings on February 5, 2014, at the Crow Tribal Sub Office (711 Central Ave.) from 12:00 pm – 3:00 pm. Representatives from Reclamation, the Crow Tribe, Bartlett & West, and the BIA will be on hand to provide project information, answer questions, and take comments from agencies. If more convenient, agencies are encouraged to attend and participate in the public open houses to be held at other times and locations. Please see Page 2 of this letter for information on the times and locations of these public open houses.

Scoping is important for gathering comments from the public and government agencies for key information, ideas, and issues relevant to the project. Scoping comments help to:

- Improve information on the local environment where the project occurs.
- Identify key issues that modify the proposed project for an environmental, social or economic need.
- Suggest why a specific environmental effect needs attention and should be an important factor for the project decision and work plans.
- Focus proposed conservation measures in the right places, to improve the overall effectiveness and expenditure of project funds.
- Recommend additional conservation measures that are necessary and reasonable.

You may provide written scoping comments to Reclamation at the mailing address or the website address listed below. Comments will also be taken at public open houses and at the agency

meeting listed below. The scoping period is expected to run through February 2014. Detailed information about this project is available at the website address provided below.

Project Information

Project website:	http://www.usbr.gov/gp/nepa/cip/index.html	
Public Open Houses:	Location and Time	Address
	Wyola - Feb. 3 6:00 pm – 9:00 pm	Wyola District Hall Little Horn Road, Wyola, MT 59089
	Crow Agency - Feb. 4 6:00 pm – 9:00 pm	Crow Agency Multi-purpose Building Crow Agency, Montana 59022
	Billings – Feb. 5 6:00 pm – 9:00 pm	Crow Tribe Sub-Office, Suites 204 and 206 711 Central Ave., Billings, MT 59102
Agency Open House:	Location and Time	Address
	Billings – Feb. 5 12:00 pm – 3:00 pm	Crow Tribal Sub-Office, Suites 204 and 206 711 Central Ave., Billings, MT 59102
Contact:	Vernon LaFontaine	
Office Phone:	406-247-7720	
Mailing Address:	Bureau of Reclamation 2021 4th Avenue North Billings, MT 59101	

The second phase of commenting will occur when the public and agencies are invited to comment on the draft EA, expected to be available in the spring of 2014. Information about the EA will be announced in the future.

Sincerely,

For

Michael J. Ryan
Regional Director

City of Yellowtail
City Government
Yellowtail, MT 59035

City of Lodge Grass
City Government
Lodge Grass, MT 59050

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Montana Dakota Utilities Co.
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NorthWestern Energy
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Billings, MT 59102

Western Area Power Administration
Upper Great Plains Region
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Billings, MT 59107

Jim Sparks
Bureau of Land Management
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Billings, MT 59101

Custer National Forest
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Billings, MT 59105

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Crow Agency, MT 59022-0039

Bighorn Canyon National Recreation Area
PO Box 7458
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NRCS-Crow Agency Field Office
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Crow Agency, MT 59022

NRCS-Hardin Field Office
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Hardin, MT 59034

US Army Corps of Engineers
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Billings Regional Office
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Montana Dept. of Natural Resources and Conservation
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Montana Dept. of Transportation
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Montana Historical Society
State Historic Preservation Office
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Helena, MT 59620

Jason Smith
Montana Office of Indian Affairs
State Capitol Building
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Helena, MT 59620

Office of the Governor
PO Box 200801
Helena, MT 59620-0801

Mr. Titus Takes Gun, Director
Crow Tribe Water Resources Department
P.O. Box #159
Crow Agency, Montana 59022-0159

Summary of Public Comments during Scoping Period (January 21 – February 28, 2014)

March 7, 2014

Crow Irrigation Project – Rehabilitation and Improvement
Programmatic Environmental Assessment

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
1-1	Zoe and Dave Opie, Big Horn River Alliance	Received 2/18/14	As you are aware the Big Horn River is one of the top fisheries in the United States. It is imperative that nothing is done to harm this environment and use the tools at your disposal to enhance it. Specifically, we need to work closely with the BOR and make sure that the Operating Criteria allows for adequate water flows to not only service the canal, but also maintain a minimum 2500 CFS to the river.	The Streamflow and Lake Level Management Plan (SLLMP) for Bighorn River and Bighorn Lake (June 16, 2000) developed flows for fisheries protection. Section 412 of the Settlement Act (Dec. 8, 2010) later clarified that the Secretary's discretion for flows is not limited by the SLLMP (in Section 4F). Since then, Reclamation has proposed operating criteria for the Yellowtail Unit which includes refining flows for fisheries management. That effort is a separate process and not within the scope of the proposed action for the Crow Irrigation Project. However, impacts to fisheries from expected changes to fisheries habitat were addressed in the Fisheries Analysis, Section 3.6. The project is expected to result in measurable improvements to water quality, which would benefit the Bighorn River trout fishery. The project is also expected to reduce the amount of water needed for irrigation, leaving more water available for in-stream flow for trout fishery, though this result depends on operation of the headworks facility at the Afterbay by Reclamation, which is independent of system repairs. Overall the project is anticipated to benefit fish populations with the potential for further benefits via optional measures and improved operations.	Project scope, CIP system operations Water quantity

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
1-2	Zoe and Dave Opie on behalf of Big Horn River Alliance	Received 2/18/14	Currently irrigation returns are flowing directly back into the river. This is creating two distinct environmental issues. The bank erosion caused by the uninhibited water flows is substantial. Particularly prominent at Soap Creek, The Big Horn Access and where the canal water returns to the river near the Two Leggings Bridge. The irrigation returns not only contain large amounts of eroded silt, but are also fertilizers and pesticides that are used on the crops. All of these issues can be controlled or eliminated by proper filtration of irrigation returns.	Erosion was addressed in the Soils Analysis, Section 3.2 and water quality was addressed in the analysis of Water Resources and Water Quality, Section 3.3. The project would potentially contribute to improved water quality in several ways: reduced system-wide water diversion, more efficient use of water per acre of land, reduced water runoff from farm fields, and reduced irrigation returns. In turn, the amount of associated chemicals, nutrients (excess nitrogen), and sediments from farm fields or canals that are carried in irrigation water returns would be reduced, leading to improvements in water quality. Sediment loads would also be reduced directly by other system repairs. As a discretionary conservation measure (Section 2.3.2), the IDT would identify site-specific options for additional treatment of wastewater during Phase 3, On-Farm Improvements, with respect to farm field runoff and other on-farm overland flows and runoff. Problem areas and possible solutions would be identified, including the use of partnerships for conservation.	Quality of return water
1-3	Zoe and Dave Opie on behalf of Big Horn River Alliance	Received 2/18/14	Property owners along the canal have other specific concerns. I am one of these land owners. The major concern is how the repair and enhancement will be done and what impact it will have on our property. There are several homes and businesses built adjacent to the Big Horn Canal. The need to work co-operatively with these land owners is vital. The land owners are aware and agree that access to the canal through their property is vital and actually a point of law. No one wants to deny access, but we are deeply concerned about damage to our property and businesses. Past maintenance efforts have been done with willful disregard to the effects of the adjacent land.	The Tribe and their engineers and sub-contractors are committed to notifying and coordinating with landowners and local residents prior to construction to address design options, construction plans, access, and land use operations. See Section 2.3.1, Conservation Measures, Human Health and Safety.	Private property impact

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
1-4	Zoe and Dave Opie on behalf of Big Horn River Alliance	Received 2/18/14	The third issue at hand is how the proposed hydroelectric plant at Afterbay and canal reconstruction will affect the Afterbay ramp access. As I know you are aware, the angling business is, at last review, responsible for 50 million plus revenue dollars to Montana. We need to be sure we continue to enhance this valuable resource, not hinder its growth.	Access to the Afterbay ramp would be maintained during canal reconstruction activities. The effects of the proposed hydroelectric plant at the Afterbay to Afterbay ramp access are outside of the scope of this analysis. The concern has been noted and shared with the Tribe.	Economic impact
2-1	Dennis Fischer, Fort Smith, MT	2/4/14	The irrigation returns to the Bighorn River bring sediment and chemicals into the river that are very harmful. This project should include plans to reduce or eliminate the irrigation runoff! I have included an article about this subject below: This Year's Gulf of Mexico Dead Zone Could Be the Biggest on Record: http://science.time.com/2013/06/19/this-years-gulf-of-mexico-dead-zone-could-be-the-biggest-on-record/	This concern was further identified as a key issue for project and discussed in Section 1.6.2 of the Draft EA. The response to Comment 1-2 above provides a general summary of what effects are expected as system repairs are completed over time.	Quality of return water
3-1	Doug Haacke, of Montana Trout Unlimited, Magic City Fly Fishers, Bighorn River Alliance, and Friends of the Bighorn River	2/14/14	The Bighorn River in Montana . . . supports two major economies and a number of minor ones. Agriculture is certainly one of those major economies. The Crow Irrigation Project's Soap Creek canal alone irrigates nearly 50,000 acres of prime agricultural land from which over 40 million dollars in yield is realized. Recreational use of the Bighorn River is the other major economy, and not surprisingly, even larger than agriculture, generating just over 50 million dollars and more when considering secondary tourism interests. The Crow Irrigation Project intends to provide *badly needed* rehabilitation work that will not only return canal and irrigation operations to capacity, but will have the additional benefit of being more efficient in that operation. River interests strongly favor efficiencies such as this because less water will need to be diverted from its natural course for irrigation. This, in fact, benefits both economies.	The need for this project is primarily socioeconomic and therefore is anticipated to provide positive benefits to individual CIP irrigation users as well as the local economy. Effects on agriculture and recreation were addressed in the Socioeconomic Analysis, Section 3.7. Potential results of the project include improved water supply and consistency in water supply, improved productivity on CIP-irrigated lands, and reinstated use of lands currently idled (temporarily non-assessable) due to system disrepair. Another potential long-term result of the project would be a positive effect on the revenue generated by businesses associated with the trout fishery of the Bighorn River.	Economic impact

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
3-2	Doug Haacke representing river interests of Bighorn River Alliance, Magic City Fly Fishers and Montana Trout Unlimited	2/14/14	As you well know, the responsibilities of the Project, its partners and its stakeholders does not end once the water reaches irrigated fields. River interests have ever growing concerns regarding the quality of the water being returned to the system. . . . In the Bighorn basin, sediments in irrigation return flows arise mostly from erosion in furrows during irrigation, and from higher than normal bank erosion due to the nature of the soil in certain watersheds (Soap Creek being the worse). Reducing both erosion and runoff would dramatically [decrease] the sediment in return flows. Sediment concentrations from irrigation returns along the Bighorn are higher than normal, and are often more than several thousands ppm. At present, the quality of the water being returned is grossly less than desirable. Besides being laden with sediment and filled with a cornucopia of nutrients unsuitable to riparian habitats, it is turbid, often opaque in clarity, smelly and warmed enough to be detrimental, and occasionally fatal, to the river fishery and aquatic insects. Compounding this issue, the turbidity of the water causes it to warm more rapidly on hot days, and the high nutrient content promotes unnatural aquatic plant growth, both which serve to lower dissolved oxygen which is detrimental to all aerobic life in the river. [Mr. Haacke continues with a list of technologies to improve the quality of return water, along with a request that they be considered by project partners and stakeholders.]	See response to Comments 1-1 and 1-2 above. If efficiency improvements are realized and irrigation returns are reduced or improved in quality, this would contribute to less of a disparity between upstream and downstream electrical conductivity and temperature measurements. This would be expected particularly for the Little Bighorn River and Pryor Creek. On the Bighorn River, water quality differences would be less obvious due to the influence of Yellowtail Dam.	Quality of return water
4-1	Duane Marler representing river interests of the Western Rocky Mountain Council of the International Federation of Fly Fishers and Bighorn River Alliance	2/23/14	The Western Rocky Mountain Council (WRMC) of the International Federation of Fly Fishers (IFFF) supports the proposed rehabilitation and improvement work on the Crow Irrigation Project. During the design and development phase of upgrading the nearly 100 year old canal system, opportunities exist to make major improvements through water conservation measures, while benefiting wildlife, fisheries and increasing irrigation operational efficiency.	The proposed action identified opportunities for improvements to system water uses that would conserve water resources and improve environmental conditions. These are included in the Draft EA (Section 2.3.2) as discretionary measures, especially with On-Farm Practices as part of the Master Plan.	Project support

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
4-2	Duane Marler representing river interests of the Western Rocky Mountain Council of the International Federation of Fly Fishers and Bighorn River Alliance	2/23/14	Maintaining and enhancing clean, cold water flows in the Bighorn River is not only important to the wonderful trout fishery, but other recreational users. . . . After irrigation water leaves agricultural fields, there is a concern among river users as to the amount of soil escaping through ditches and into discharge canals, which eventually gets into the river. Pesticides, animal waste and agricultural chemicals contribute to polluted water. Using newer water cleansing technologies in combination with sediment retention basins would help eliminate contaminated water. Following are two main issues that are of concern: SEDIMENT CONTROL Irrigation return flows containing sediments from the Bighorn basin occur mainly from erosion in furrows, normal bank erosion and storm runoff events. Methods of controlling erosion and runoff water would reduce the amount of sediment to the river. Concentrations of sediment along the Bighorn River from irrigation returns are higher than normal. The WRMC certainly urges the Project to develop ways of minimizing sediment deposits flowing into the Bighorn. WATER QUALITY The current quality of return water is far less than desirable. In addition to containing sediment and unsuitable nutrients, the turbid water temperature can become quite warm causing detrimental effects on the river fishery and aquatic insects. On hot days the turbidity of the water causes the high nutrient content to promote unnatural aquatic plant growth, resulting in lower dissolved oxygen detrimental to aerobic life in the river. Methods to clean as well as de-nutrify and cool return flows are important to the health of riparian areas. [Mr. Marler continues with a list of guidelines to improve the quality of return water, along with a request that they be considered by project partners and stakeholders.]	These concerns were further identified as key issues for the project and included in Section 1.6.2 of the Draft EA. See response to Comment 1-2 above which provides a summary of the overall expected results of the proposed action.	Quality of return water

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
5-1	Glenn Erikson, Conservation Director at International Federation of Fly Fishers	2/25/14	What a great resource we all have in the Big Horn River system. We at the International Federation of Fly Fishers (IFFF). . . treasure it, and thereby support the proposed rehabilitation and improvement work for the CROW Irrigation Project. At the same time, we have a concern about enhancing its future water quality. Particularly relating to sediments the quality of the water that comes back into the river. [Mr. Erickson continues by referring to a detailed letter from Duane Marler and expressing the importance of resources to IFFF members and the state economy.]	This concern is identified as a key issue and included in Section 1.6.2 of the Draft EA. Based on similar concerns, please see the response to Comment 1-2 above for a summary of effects to water quality.	Quality of return water
6-1	Gordon Real Bird Sr.	2/3/14	We have 500 acres south of St. X [St. Xavier] from the Main Road there is no access to the land. The Soap Creek Ditch and Big Horn ditches keep us from getting to our land. Can this Crow Irrigation Project build us a bridge?	The Tribe and their engineers and sub-contractors are committed to notifying and coordinating with landowners and local residents prior to construction to address design options, construction plans, access, and land use operations. This specific concern is outside of the scope of this analysis, but has been noted and shared with the Tribe.	Private property impact
7-1	Henry Old Horn Sr.	2/4/14	If the present environmental assessment compliance is necessary on already established irrigation ditches since original implementation of irrigation ditches within the Crow Reservation with already established easements, why are we concerned with the environmental disturbance? The existing irrigation already goes thru fee lands, allotted lands, tribal lands, already established since the early 1900's.	Routine repairs to existing irrigation projects are often made without extensive environmental reviews and public comment. For many routine CIP maintenance activities, there are no significant environmental effects and the BIA may categorically exclude these activities from further review under NEPA. However, the CIP is in need of major repair and public funds are being provided for extensive work. Section 404 of P.L. 111-291 requires project compliance with applicable environmental laws including review under NEPA, for which Reclamation is responsible.	Need for environmental assessment
8-1	Joe Bearcrane	2/5/14	Is there any Crow farmer that's actually using the irrigation water?	The CIP serves Crow farmers, though the number is unknown and the number of non-tribal farmers is greater. See Section 3.8, Trust Assets and Environmental Justice, for further discussion on land ownership and anticipated benefits to the Tribe and its members.	Tribal/Trust Benefits

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
9-1	Matt McMeans	1/29/14	Part of any healthy watershed directly depends upon the quality of the water within. A very important part of this project should include improving water quality of irrigation returns. Runoff from flood irrigation has a profound effect on turbidity in both the Bighorn and Little Horn basins. Cleaning up the returns would greatly improve the water quality of both water sheds, and provide safer cleaner water for all water users.	Because turbidity is a concern for water quality, especially from irrigation and return flows, it was identified as a key issue. The Draft EA (Section 1.6.2) describes how this issue was addressed. Please see response to Comment 1-2 above for a summary.	Quality of return water
10-1	Mike McMeans	2/4/14	. . . For years now we have been hoping that there would be repairs made to the Crow Irrigation Project. However, after reviewing the project parameters we are concerned that not enough emphasis has been put on mitigating and or controlling the returns that flow back into the river at a multitude different spots. By controlling these returns the huge amounts of sediment, fertilizers and chemicals that leave the fields with the drain water could be curtailed or stopped from entering the river. There are many returns that enter the river directly from crop fields. These returns have no filtration and whatever moves off the fields with the water flows directly into the river. At least two different areas along the river have huge caverns created by this runoff. These caverns continue to erode and put tons of silt into the river. The main return for the canal which is near Two Leggings Bridge is a small Grand Canyon. It continues to erode and dump silt into the river. There have been no repairs to the chute that leads from the canal into a ravine and then into the river since the canal was built. It is quite a sight. One of the tributaries, Soap Creek, has several returns that run directly from crop fields into it creating a muddy and polluted stream. It dumps into the Big Horn and keeps the Big Horn a muddy mess during irrigation season. There are other streams that have returns dumping into them also. They also need to have corrective action taken to prevent the continued dumping of sediment into the Big Horn River.	The dilapidated condition of the Crow Irrigation Project presents a need to take action for improvements including measures to protect water quality from further degradation. Water quality concerns were identified as a key issue (Section 1.6.2 of the Draft EA). Farming practices and specific problems sites on private lands are not subject to authority provided under the Settlement Act (Section 405) for the CIP. However, there are a number of opportunities and discretionary action identified in the Draft EA (Section 2.3.2) that can be taken to address some of the specific locations within the project area that are of concern. The Master Plan provides the opportunity to develop recommendations to address these concerns through On-Farm Improvements. The response provided for Comment 1-2 above indicates that the proposed action, when completed, is expected to contribute to improved water quality conditions in the future.	Quality of return water

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
10-2	Mike McMeans	2/4/14	This river is used by thousands of people for recreation purposes. A lot of small business depend on this river. Anything that can be done to better and protect it will only increase the opportunity for business growth and more jobs for local people.	This concern is identified as a key issue in the Draft EA (Section 1.6.2). There are a number of positive outcomes for recreation and business when the project work is completed. Also see response to Comment 3-1 above.	Economic impact
11-1	Open House, verbal	February 3-5, 2014	My land is separated by canal/ditches and I have trouble with access. Can the CIP build bridges to allow landowners access to their properties?	The Tribe and their engineers and sub-contractors are committed to notifying and coordinating with landowners and local residents prior to construction to address design options, construction plans, access, and land use operations.	Private property impact
11-2	Open House, verbal	February 3-5, 2014	Is the project going to cost landowners additional money?	This concern is outside the scope of the NEPA analysis but has been shared with the Tribe.	Project cost and funding
11-3	Open House, verbal	February 3-5, 2014	What changes to O & M will occur?	Operations and Maintenance (O&M) of the CIP system is under the responsibility of the BIA, and thus outside the scope of the EA. However, descriptions of the current O&M of the CIP have been assessed in previous engineering reports and are summarized in the Engineering Master Plan for the project, along with recommendations. The EA focuses on the rehabilitation of existing facilities; repair designs and conservation measures that will also improve operations and maintenance have been incorporated and applied when possible. Many of the conservation measures proposed for the project will indirectly address many of the O&M concerns.	Project scope, CIP system operations
11-4	Open House, verbal	February 3-5, 2014	How many Crow irrigators are there and who is benefitting from the project?	The CIP serves Crow farmers, though the number is unknown and the number of non-tribal farmers is greater. See Section 3.8, Trust Assets and Environmental Justice, for further discussion on land ownership and anticipated benefits to the Tribe and its members.	Tribal/Trust Benefits
11-5	Open House, verbal	February 3-5, 2014	Where is the project money? And what is the Tribe doing with it?	This concern is outside the scope of the NEPA analysis but has been shared with the Tribe.	Project cost and funding

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
11-6	Open House, verbal	February 3-5, 2014	People should have been informed about the whole thing earlier.	The Settlement Act of 2010 was based in part on surveys and engineering reviews of the Crow Irrigation Project from 2005-2009. These actions have been published and are available on public, including tribal, record. Since then, new information has been collected and compiled into a Master Plan for the project. The Draft EA is intended as an opportunity for people to review and comment on the project. Chapter 5 describes public involvement efforts for developing the project proposal.	Public participation
11-7	Open House, verbal	February 3-5, 2014	There are water quality concerns in the Upper Little Bighorn due to livestock manure being pushed into the stream. EPA was contacted but does not do much, except maybe for a few fines.	Remediation efforts for canals include livestock damage repair (Section 2.2.2.2). An option is to install fences parallel to canals where warranted, in conjunction with earthen access ramps. The feasibility of this option would depend on coordination with landowners and the BIA.	Quality of return water
11-8	Open House, verbal	February 3-5, 2014	There is a concern with outdated leases that have not kept pace with the rising value of crops. The value of the lease for the landowners is not worth much anymore.	This concern is outside the scope of the NEPA analysis but has been shared with the Tribe.	Leased land operations
11-9	Open House, verbal	February 3-5, 2014	There is a disparity in farming loans and benefits for native landowners. Benefits should focus on providing support to Tribal members to farm their lands.	See Section 3.8, Trust Assets and Environmental Justice, for further discussion on land ownership and anticipated benefits to the Tribe and its members.	Tribal/trust benefits
11-10	Open House, verbal	February 3-5, 2014	There was mention of landowners getting billed for water, not receiving water, and then having their Social Security checks reduced for the water bills (not paid).	O&M of the CIP system is under the responsibility of the BIA, and thus outside the scope of the NEPA analysis. The concern has been noted and shared with the Tribe.	Project scope, CIP system operations
11-11	Open House, verbal	February 3-5, 2014	What are the regulations that would control land lessees building stock ponds and drilling wells on their own free will?	This concern is outside the scope of the NEPA analysis but has been shared with the Tribe.	Leased land operations

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
11-12	Open House, verbal	February 3-5, 2014	There are general concerns about the administration of the CIP by the BIA and the Tribe. It is felt the whole project was jammed through without a lot of input from the landowners.	O&M of the CIP system is under the responsibility of the BIA, and thus outside the scope of the environmental review under NEPA for the rehabilitation and improvement work. Engineering assessments documenting system disrepair have been ongoing since 2005. The federal government authorized and funded the proposed work through Public Law (P.L.) 111-291 (Section 405) December 8, 2010, which was also signed by the Chairman. Public involvement for the EA has included mailings, website development, community notices, and three public input meetings in February 2014. Details of the public involvement effort are included in Chapter 5, Consultation and Coordination. Landowners that might be affected by the project will be notified of any pending activities ahead of time so that potential conflicts may be addressed.	Public participation
11-13	Open House, verbal	February 3-5, 2014	Can the Tribe come onto private lands and do what they want to fix the irrigation system? There is a concern there might be some damage done to private lands.	The Tribe and their engineers and sub-contractors are committed to notifying and coordinating with landowners and local residents prior to construction to address design options, construction plans, access, and land use operations. See Section 2.3.1, Conservation Measures, Human Health and Safety.	Private property impact
11-14	Open House, verbal	February 3-5, 2014	The irrigation system has damaged the rivers and agricultural uses have caused a decline in water quality. People used to swim in the river (swimming holes) and eat the fish, but not so much now.	Water quality is a key issue for the project and included in the Draft EA (Section 1.6.2). Also see the response to Comment 1-2 above.	Quality of return water
11-15	Open House, verbal	February 3-5, 2014	Some discussion took place revolving around the Bozeman Trail with questions aimed towards determining whether or not the unit was to be included in rehabilitation and improvement efforts.	The Bozeman Trail unit is within the scope of work for the project. However, it would have lower priority than other units that serve more Tribal and Allotted acreages. For further detail see Section 3.8.2, Land Tenure within the Project Area.	Project scope, CIP system operations
11-16	Open House, verbal	February 3-5, 2014	. . . another comment was regarding a resident who was experiencing flooding at his residence following the installation of a new center pivot above his place. His residence is located downstream of Wyola Lateral 362.	This specific concern is outside the scope of the NEPA analysis, but it has been shared with the Tribe. O&M of the CIP system is under the responsibility of the BIA.	Project scope, CIP system operations

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
11-17	Open House, verbal	February 3-5, 2014	There was . . . discussion on rehabilitating the system as several residents noted that they can no longer operate turnouts. In addition, the recommendation was made to look at not only rehabilitate the existing system, but also look at improvements to create a more up-to-date system.	Turnouts are included in the project scope (Section 2.2.2.1). Individual turnouts will be evaluated during site-specific assessment and design phases. Though repair and rehabilitation of existing infrastructure is priority, site-specific assessments will consider options to construct or install the infrastructure for water measurement devices as funding allows, at the discretion of the Tribe. Modern materials and designs will be used for all repairs. Converting flood irrigation to more efficient types of on-farm systems is also a later option for the project. See Section 2.2.2, Construction Actions for the CIP, for more detail on proposed work.	Project scope, CIP system operations
11-18	Open House, verbal	February 3-5, 2014	Brought to the attention of the group was the issue of willows in the ditch, for which some are used for traditional ceremonies and sweat lodge construction. Therefore, there were concerns on their removal.	In the event that significant willow removals are identified as part of a specific CIP project, mitigation plantings of willow would be considered as compensation by IDT review. See Section 3.10, Vegetation, for further discussion.	Wildlife/plants
11-19	Open House, verbal	February 3-5, 2014	In talking with the NRCS, a significant number of laterals in the Two Leggins Unit have been put into pipe (NRCS has provided support for many of the projects). The only major issue has been that associated with algae from the Bighorn River (clogging pipelines). Overall, this practice has been very well-accepted with favorable results. There is a drainage unit in the Two Leggins Unit which had made this more feasible to accomplish.	Comment noted and shared with the Tribe and their engineers.	Project scope, CIP system operations
11-20	Open House, verbal	February 3-5, 2014	There was . . . discussion on the possibility of teaming up to help stretch available funds, particularly for on-farm improvements, which was the primary area that the NRCS felt that they could be of considerable benefit.	Comment noted and shared with the Tribe and their engineers.	Project scope, CIP system operations
11-21	Open House, verbal	February 3-5, 2014	A significant portion of the conversation revolved around the issue of the lack of water in Pryor, with many individuals aware of the disappearance of local streams in the area.	The Pryor Unit is within the scope of this project (Section 2.2.2.1), though additional field investigations and testing are necessary to determine feasible solutions for the problems with this part of the system.	Water quantity

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
11-22	Open House, verbal	February 3-5, 2014	. . . the status of the drain system (or lack thereof) in the Bighorn Unit was discussed. During this discussion, it was identified as a key culprit for the sediment transferred into the Bighorn River and erosion issues. In many locations, ditches double over as both a water supply as well as a drain with wastewater re-entering ditches at the bottom of field.	Drain construction and re-design of existing canal routes are not part of the project scope. However, numerous aspects of the proposed work will address erosion and sediment concerns. See response to Comment 1-2 above. Though beyond the scope of the project, opportunities for improved O&M would also address these concerns.	Project scope, CIP system operations
11-23	Open House, verbal	February 3-5, 2014	The importance of wetlands was also discussed, in particular the role that they play in filtering wastewater before it enters the Bighorn River.	Potential impacts to wetlands have been addressed in Section 3.4, Wetlands. Site-specific wetland delineations will be completed prior to any on-the-ground activities and the results will be used during IDT review to determine site-specific avoidance and mitigation measures, including the option of the restoration or creation of mitigation wetlands.	Quality of return water, role of wetlands
11-24	Open House, verbal	February 3-5, 2014	Beavers were . . . identified as a significant issue in the Pryor Unit. One gentleman noted the problems that they create, but also the good that they do.	Wildlife resources and habitat have been evaluated for the project area in Section 3.11. Specific concerns with beavers in the Pryor Unit will be addressed during IDT review of that unit.	Wildlife/plants
11-25	Open House, verbal	February 3-5, 2014	. . . prairie dogs were . . . noted as a key problem in the Pryor Unit. One gentleman expressed great interest in introducing black-footed ferrets, but noted that he thought that the minimum acreage of a prairie dog community to be considered for reintroduction was 1,500 acres.	A biological assessment evaluated threatened, endangered, and candidate species and concluded the proposed action will have no effect on black-footed ferrets. Site-specific pre-construction habitat surveys would include prairie dog colonies and results would be used during IDT review. Refer to the biological assessment and Sections 3.11.3 and 3.11.5 of the EA.	Wildlife/plants
11-26	Open House, verbal	February 3-5, 2014	Concerns were brought up for negative impacts to eagles and other birds of prey that may occur during rehabilitation activities.	Wildlife resources and habitat have been evaluated for the project area in Section 3.11. Site-specific concerns will be addressed during IDT review.	Wildlife/plants
11-27	Open House, verbal	February 3-5, 2014	Concerns were brought up for impacts to sundance sites.	Potential impacts to cultural resources and sites have been addressed in Section 3.9. Cultural inventories and consultation with the THPO will be done prior to site-specific construction to identify site-specific concerns.	Cultural sites

Tally of Comment Topics

Quality of return water: 10

Project scope, CIP system operations: 9

Private property impact: 4

Wildlife/plant impacts: 4

Tribal/Trust benefits: 3

Economic impact: 3

Project cost, funding: 2

Public participation: 2

Leased land operations: 2

Water quantity: 1

Role of wetlands: 1

Project support: 1

Need for EA: 1

Cultural sites: 1

Appendix B

Distribution List for the Draft EA
Summary of Draft EA Comments
Additional Clarification and Edits of the Draft EA

Distribution List for the Draft EA

Interested or Affected State or Federal Agencies

Bighorn Canyon National Recreation Area, Fort Smith, MT
NRCS Crow Agency Field Office, Crow Agency, MT
NRCS Hardin Field Office, Hardin, MT
US Army Corps of Engineers, Billings Regulatory Office, Billings, MT
USFWS, Ecological Services Montana Field Office, Helena, MT
USFWS, Robbin Wagner, Lewistown, MT
Montana Department of Transportation, District 5 Office, Billings, MT

Individuals or Special Interest Organizations that Commented During Scoping

Zoe and David Opie, Bighorn River Alliance, Fort Smith, MT
Dennis Fisher, Fort Smith, MT
Doug Haake, Trout Unlimited, Chair; Magic City Fly Fishers, Director; Bighorn River Alliance, Advisory Board; Friends of the Bighorn River, founder, Billings, MT
Duane Marler, WRMC Conservation Chairman, International Federation of Fly Fishers, Meridian, ID
Glenn Erikson, Conservation Director, Federation of Fly Fishers
Gordon Real Bird, Sr., Wyola, MT
Henry Old Horn, Crow Agency, MT
Joe Bearcrane, Billings, MT
Matt McMeans, Fort Smith, MT
Mike McMeans

Public Spaces Where Hardcopy EA Will Be Available for Review by General Public

Crow Tribe Headquarters, Crow Agency, MT
Crow Nation Legislative Branch Office, Crow Agency, MT
Crow Tribe Water Resource Department, Crow Agency, MT
Crow Tribe Sub Office, Billings, MT
Little Big Horn College Library, Crow Agency, MT
Big Horn County Library, Hardin, MT
Bureau of Reclamation Regional Office, Billings, MT
Bureau of Indian Affairs Regional Office, Billings, MT

Summary of Public Comments on Draft EA (October 17 – November 21, 2014)

January 2015

Crow Irrigation Project – Rehabilitation and Improvement
Programmatic Environmental Assessment

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
1-1	Robbin Wagner, Fishery Biologist, US Fish and Wildlife Service	11/19/14	On page 3-52 of the Draft EA, in Table 3-7: Fish Species of the Project Area; under the heading, Native Species; Northern Pike are common but not native to the area and should be placed in the Exotic Species box. Other species that should appear in the Exotic Species box are; Brook Trout and Yellow Perch.	Corrections were made as suggested in Table 3-7, now pages 3-52 and 3-53.	Content correction
1-2	Robbin Wagner, Fishery Biologist, US Fish and Wildlife Service	11/19/14	In 2002, the Crow Tribal Legislature designated Yellowstone Cutthroat Trout a Species of Special Concern on the Crow Reservation under Joint Action Resolution number JAR0231. This should be included in the references in Section 3.6.2.	A brief paragraph was added in Section 3.6.1, Fisheries Regulations, to address tribal and state-level fish species of concern, including this resolution as suggested. Citations were also added as appropriate in Section 3.6.2, and a reference to the tribal law was added to the References, Section 6.0.	Content addition
2-1	David Nelson, BIllings, MT	11/21/14	Page 3-33 near top: Change to "erosion would decrease from: repairs to drops, checks, chutes, and wasteways". I thought wasteways should be added because a wasteway on one of the units was very badly eroded when I visited it about 15 years ago. Maybe it has been rehabilitated since then. This sentence near the bottom of the page adequately addresses repairs, which would include repairs to wasteways: "Temporary and long-term erosion and sediment control structures would be installed as necessary according to site-specific needs."	Repairs to existing wasteways are planned as part of the project, and would be expected to reduce soil erosion similar to repairs to the other structures. The sentence was changed as suggested on page 3-33. The sentence in Section 3.2.4 regarding temporary and long-term erosion and sediment control structures pertains to structures such as straw waddles, silt fences, geotextiles, and other products intended to stabilize soils during and after repair and construction work for the project. These structures are not part of the permanent irrigation system, but are implemented as part of the project to minimize soil impacts.	Content addition and clarification

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
2-2	David Nelson, BIllings, MT	11/21/14	3-36: "Reclamation is also charged with releasing water in the amount equal to all new development in the reach that includes the Bighorn Irrigation Unit". Is it meant "new irrigation development"? Or what kinds of development are included? If this is the new development described on page 3-38, maybe you should refer to that page here.	The streamflow and lake level management plan (SLLMP) defines “Developed” or “Development” as water diverted or removed from the Bighorn River above the Downstream Measuring Point or from Bighorn Lake pursuant to the Tribal Water Right for use withIn or outside the Crow Reservation as authorized by the Compact (SLLMP, Sect. 1.A.). Authorized uses for Yellowtail Dam and Bighorn Lake are to provide water for Irrigation, municipal, and Industrial uses; to provide power generation and flood control; and to enhance fish and wildlife and recreation in the Bighorn River and Bighorn Lake (under Flood Control Act 1944). Therefore, new development would include new irrigation development, such as the potential Dunmore Bench development, described in Section 2.2.2.5 and discussed in Section 3.3.6 on page 3-43. It could also include other types of development for other uses. A clarifying phrase was added to the noted sentence on page 3-36. (The reference to “new development described on page 3-38” could not be found and is assumed to mean the discussion on page 3-43.)	Clarification
2-3	David Nelson, BIllings, MT	11/21/14	3-44: "Groundwater aquifers are not affected in any way by the CIP system". That is not true, because much of the water lost in conveyance and surface irrigation actually percolates down to the water table. Raising the water table can have both good and bad effects.	Corrections and clarifications were made as suggested to the discussion and analysis in Section 3.3.6, under heading “Groundwater”, page 3-44.	Content correction
2-4	David Nelson, BIllings, MT	11/21/14	3-62: Brownfield sites. Describe what a Brownfield site is.	As suggested, a sentence was added to explain the term “brownfield” on page 3-62, along with a reference in Section 6.0.	Clarification

Comment Number	Entity	Date of Comment	Comment	Response	Comment Topic
3-1	Kelly Douglas, Fish & Wildlife Biologist, US Fish and Wildlife Service, Helena, MT	Via phone on 12/2/14 and via email on 12/16/14	The Service is not aware of any bald and golden eagle nests within one mile of the proposed project activities. During nesting season, especially early in the season, eagles can be very sensitive to disturbance near the nest site and may abandon the nest as a result of low-level disturbance, even from foot traffic. We recommend that the presence and activity status of bald and golden eagle nests within one mile of the project be determined prior to construction. Where work is proposed within 0.5 mile of an active eagle nest, we recommend that you comply with the seasonal restrictions and distance buffers specified in the *2010 Montana Bald Eagle Management Guidelines: An Addendum to Montana Bald Eagle Management Plan (1994)* during construction.	Corrections and clarifications were made as recommended to Section 2.3.1, to bullet points regarding eagles under heading “Biological Resources”, page 2-20 and 2-21 and to Section 3.11.6, under heading “Eagles”, page 3-75.	Content addition and clarification

Additional Clarification and Edits of the Draft EA

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Section	Location	Topic	Correction
2.3.1	p. 2-21, "Soils/Water/Air Resources", first bullet	"Site-specific Storm Water Pollution Prevention Plan (SWPPP) and Spill Prevention Containment and Countermeasures (SPCC) plans would be prepared and implemented for all construction activities, which would outline measures and practices for control of water discharge/dewatering, stormwater runoff, sediment discharge, erosion, dust, spills, and pollution."	"Stormwater best management practices (BMPs) and spill prevention and containment measures would be implemented for all construction activities for control of water discharge/dewatering, stormwater runoff, sediment discharge, erosion, dust, spills, and pollution. Site-specific Storm Water Pollution Prevention Plans (SWPPP) and Spill Prevention Containment and Countermeasures (SPCC) plans would be prepared and implemented for projects when required by EPA rules and regulations." Numerous other references to "site-specific" plans were corrected as necessary throughout the document.
3.3.5	p. 3-39, bulleted list at top of page	The citation for surface water designations was incorrect.	The correct citation was added at the end of the bulleted list.
3.3.5	p. 3-39, para. 1	Citation for water quality impairments.	An additional citation was added for the MTDEQ listing.
5.3	p. 5-86	Section update.	Paragraph was revised to reflect distribution of the Draft EA in the past tense and to include the dates of the comment period.
5.3.2	p. 5-87	Section update.	Reference to Appendix C was added: "Draft EA comments and responses are summarized in Appendix C. Copies of all responses are included in the Project Record."