RECLAMATION

Managing Water in the West

Box Butte Dam: Safety of Dams Corrective Action

Mirage Flats Unit, Pick-Sloan Missouri Basin Project, Nebraska

Environmental Assessment

U.S. Department of the Interior
Bureau of Reclamation

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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.

Box Butte Dam: Safety of Dams Corrective Action

Environmental Assessment

Mirage Flats Project, Nebraska

Dawes County

Lead Agency
United States Department of the Interior
Bureau of Reclamation
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Cover photo: Box Butte Dam

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Acronyms

AF	Acre-feet
AFE	Annual Facility Examination
BGEPA	Bald and Golden Eagle Protection Act
BUL	Biologically Unique Landscape
CAS	Corrective Action Study
CFR	Comprehensive Facility Review
CWA	Clean Water Act
DOI	Department of the Interior
DSPR	Dam Safety Priority Rating
E.O.	Executive Order
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ITA	Indian Trust Asset
MBTA	Migratory Bird Treaty Act
MFID	Mirage Flats Irrigation District
NAAQS	National Ambient Air Quality Standard
NAGPRA	Native American Graves Protection and Repatriation Act
NDEQ	Nebraska Department of Environmental Quality
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
PFR	Periodic Facility Review
PFYC	Potential Fossil Yield Classification
SHPO	State Historic Preservation Office
SOD	Safety of Dams
SWPPP	Storm Water Pollution Prevention Plan
THPO	Tribal Historic Preservation Office
USFWS	U.S. Fish and Wildlife Service
WMA	Wildlife Management Area

Table of Contents

Chapter 1: Purpose and Need

The United States Department of the Interior (Department or DOI), Bureau of Reclamation (Reclamation) is responsible for ensuring that its facilities do not present unreasonable risks to the public, public safety, property and/or the environment. Reclamation has determined that safety deficiencies exist at Box Butte Dam. In accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, this Environmental Analysis (EA) will evaluate the effects of undertaking corrective actions to reduce safety risks at Box Butte Dam as part of Reclamation's Dam Safety Program.

1.1 Project Location and Background

Box Butte Dam and Reservoir are components of the Mirage Flats Unit of the Pick-Sloan Missouri Basin Program. Box Butte Dam and Reservoir is located in along the Niobrara River in Dawes County, Nebraska, approximately 10 miles north of Hemingford, Nebraska and 23 miles southwest of Chadron, Nebraska (Figure 1). The Niobrara River originates in Wyoming and flows in an easterly direction to Box Butte Reservoir about 135 miles downstream from its origin. The project location is located in Sections 28 and 33 of Township 29 North, Range 49 West.

Box Butte Dam is an earth and gravel embankment with a controlled irrigation outlet works and two uncontrolled spillways. The dam consists of two portions. The left side or main dam, looking downstream, has a cutoff trench extending to the top of a soft sandy siltstone bedrock. The right side of the dam, also called the dike, has an approximate 25 foot deep cutoff trench that does not extend to bedrock. The dam's crest length is 5,508 feet with a structural height of 87 feet above the original river bed. The top of the irrigation pool is 4,007 feet above mean sea level. Figure 2 depicts the Box Butte Reservoir allocations and Table 1 provides additional reservoir statistics.

The primary purpose of Box Butte Dam and Reservoir is to provide irrigation benefits, along with additional recreation and fish and wildlife benefits. Reclamation has transferred the operation and maintenance responsibility of the Mirage Flats Unit to the Mirage Flats Irrigation District (MFID).

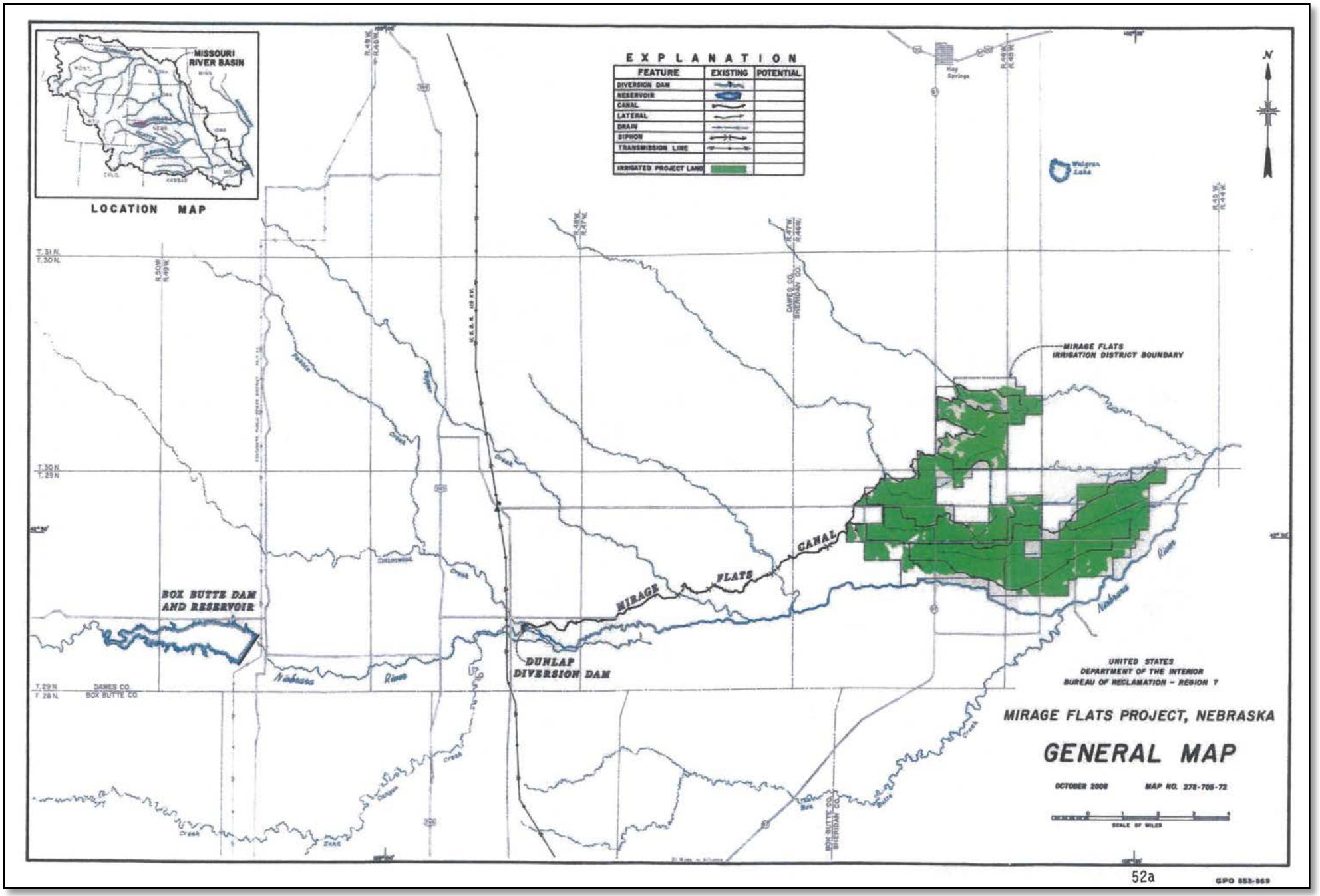

Figure 1: General Project Map

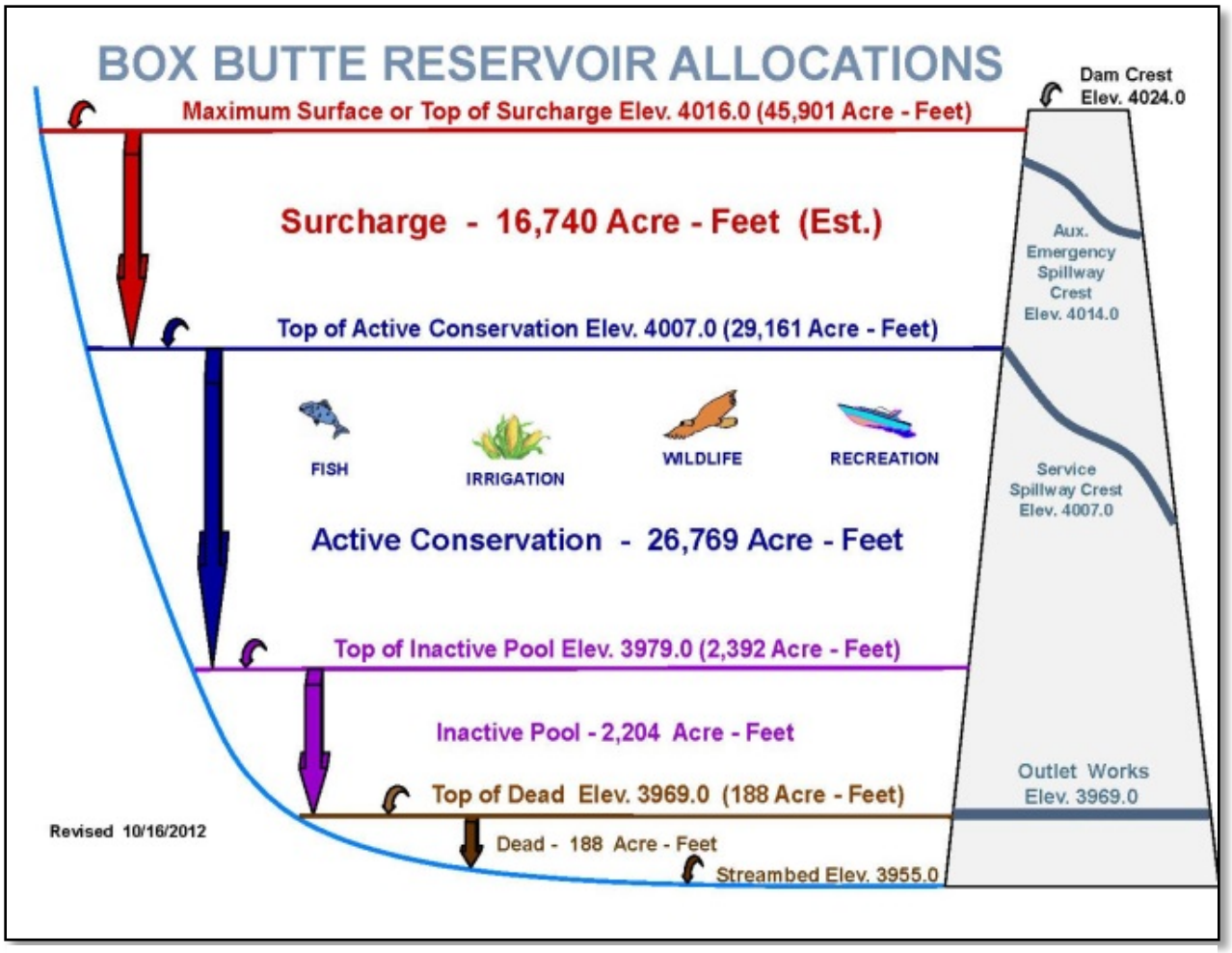

Figure 2: Box Butte Reservoir Allocations

The top of the active conservation storage at elevation 4007.0 feet corresponds to the crest of the uncontrolled service spillway. The surcharge capacity is above the crest of the uncontrolled service spillway. There is also an uncontrolled auxiliary (emergency) spillway above elevation 4009.0 feet. When the reservoir is at the top of conservation pool (elevation 4007.0), water backs upstream approximately four miles from the dam. The reservoir has a shoreline length of approximately 14 miles with a water surface area of 1,537 acres. The total storage of Box Butte Reservoir is 45,901 acre-feet (AF). The reservoir capacity includes 188 AF of dead storage, 2,204 AF of inactive storage, 27,769 AF for irrigation. There is no flood control pool at Box Butte Reservoir.

Table 1: Reservoir Statistics

Shoreline length at full pool (miles)	14
Conservation pool (AF)	24,769
Recreation (acres)	180
Wildlife (acres)	433
Operations (acres)	47
Total Land (acres)	660
Water surface at full pool (acres)	1,537
Total Facility Land & Water (Acres)	**2,260**

In 1979, a routine inspection identified water seepage through the dam. Subsequent surveys, studies, and reports have indicated that seepage rates are directly related to the reservoir water surface elevation. Significant amounts of seepage occur when the elevation exceeds 3,998 feet and seepage areas begin to dry up as the reservoir elevation is drawn below 3,990 feet (Reclamation 2014b). Monitoring has indicated the seepage is transporting sediment which appears to be very similar to known soils within the dam's structure, which may indicate internal erosion. In 2011, Box Butte Reservoir reached a reservoir water surface elevation of 4,004.45 feet, the highest surface elevation seen since 1959, and seepage rates reached the highest level observed since monitoring began. These high seepage rates transported a significant amount of sediment into monitoring structures, which was seen as evidence of an active internal erosion condition (Reclamation 2011b). The dam's existing internal drainage features are not sufficient to filter this sediment out of the seepage and the dam does not meet current embankment design standards with respect to seepage control and filtration. As a result, Reclamation began exploring remediation options to correct the water seepage, sedimentation, and possible internal erosion conditions.

1.2 Authority

The modifications proposed for Box Butte Dam are authorized by the Reclamation Safety of Dams Act of 1978 (Public Law 95-578, November 2, 1978), as amended by Public Law 98-404 (August 28, 1984), Public Law 106-377 (October 27, 2000), Public Law 107-117 (January 10, 2002), and Public Law 108-439 (December 3, 2004). Henceforth, the original Safety of Dams Act and these amendments are referred to as the Act.

The Act authorizes the Secretary of the Interior to construct, restore, operate, and maintain new or modified features at existing Federal Reclamation dams for safety purposes when it is determined that the structure presents an unacceptable risk based on certain guidelines.

Section 3 of the Act states that "construction authorized by this Act shall be for purposes of dam safety and not for the specific purposes of providing additional conservation storage capacity or of developing benefits over and above those provided by the original dams and reservoirs."

1.2.1 Dam Safety Program Overview

Reclamation's Dam Safety Program (SOD) was officially implemented in 1978, following passage of the Act. The SOD program is managed primarily from Reclamation's Dam Safety Office, located in Denver, Colorado. The SOD program exists to (1) ensure that Reclamation

facilities do not present unreasonable risks to the public, public safety, property, and/or the environment; and (2) take appropriate action to reduce and manage risks in an efficient and cost effective manner. Any selected course of action relies on assessments of risks and liabilities with environmental and public input to the decision-making process.

Under the umbrella of SOD, Reclamation identifies structures that, without modification, would pose unacceptable risks. Dams are evaluated for deficiencies in three ways:

1. Statically: An evaluation of how likely and to what extent the dam will suffer from seepage and piping failure. Although all dams seep to some extent, seepage is managed through properly designed and constructed filters and drains. When seepage is improperly managed, the risk of piping or embankment failures increases.
2. Hydrologically: An evaluation of how likely and to what extent the dam can withstand a large flood. Properly sized spillways and adequate reservoir capacity are used to prevent overtopping of the dam.
3. Seismically: An evaluation of how likely and to what extent the dam will suffer damage from seismic events (such as earthquakes, volcanic activity, detonation of explosives, etc.)

In order to identify and evaluation deficiencies, Reclamation facilities undergo comprehensive facility reviews (CFRs), periodic facility reviews (PFRs), and annual facility examinations (AFEs). CFRs evaluate every aspect of the facility for static, hydrologic, and seismic deficiencies and are conducted on a six-year cycle. PFRs evaluate mainly operation and maintenance issues and are conducted on a three-year cycle, on an alternating schedule with CFRs. AFEs are the least detailed review, typically a checklist format, and are conducted annually. The cost of these studies and investigations are non-reimbursable and project beneficiaries have no repayment obligations.

If a deficiency is identified, a Corrective Action Study (CAS) is prepared to define what corrective actions are required and the cost of such corrective actions. Additionally, the facility is given a Dam Safety Rating (DSPR), which provides a means for Reclamation to establish the urgency of risk management activities and the relative priority of these actions within the overall inventory of dams. The CAS is then sent to the Office of Management and Budget and the U.S. Congress for approval. Upon approval of the CAS, corrective actions are undertaken. The Federal government is responsible for 85% of the cost of corrective actions, with project beneficiaries responsible for the remaining 15%.

1.3 Proposed Action

Based upon Reclamation's SOD evaluations, Box Butte Dam has been classified as a DSPR 3 (moderate to high risk) facility. This classification indicates that Box Butte Dam has potential dam safety deficiencies with significant risks or probabilities of dam failure. If this situation is not addressed, continued seepage and sediment transportation could lead to dam failure by internal erosion.

In cases of DSPR 3 classification, the SOD program dictates that Reclamation must determine whether it is appropriate to proceed with actions that either better define the dam safety risks or take actions to directly reduce the dam safety risk (Reclamation 2011a). Reclamation's CAS

(Reclamation 2013b) determined that "additional studies are unlikely to reduce the risk estimates," and thus, Reclamation should proceed with actions to directly reduce the dam safety risk (Reclamation 2015b).

Reclamation proposes to undertaken corrective actions to reduce dam safety risks, as presented in Chapter 2 of this EA, beginning in the fall of 2017.

1.4 Purpose and Need for the Action

The need for corrective actions at Box Butte Dam arises from Reclamation's duty to ensure that Reclamation dams do not present unreasonable risks to people, property, and the environment. Currently, the risk of dam failure due to persistent seepage issues at Box Butte Dam is at an unsatisfactory level. Corrective actions are needed to reduce the risk of dam failure to satisfactory levels according to Reclamation's SOD program guidance.

Undertaking corrective actions will serve the following purposes:

1. Downgrading of the Box Butte Dam DSPR from a DSPR 3 (Moderate to High Priority) to DSPR 4 (Low to Moderate Priority) or DSPR 5 (Low Priority). This downgraded DSPR will indicate reduction of risk of dam failure to a satisfactory level that will not indicate a pressing need for action (Reclamation 2011a; Reclamation 2015b).
2. Continue to meet the primary purposes of Box Butte Dam, including delivery of irrigation water in accordance with the terms and conditions of Contract No. 1-07-70-W0031, *Contract between the United States and the Mirage Flats Irrigation District Related to the Mirage Flats Project*, as amended.
3. Continue to provide fish, wildlife, and recreation benefits by maintaining a minimum reservoir water surface elevation of 3,979 feet, in accordance with the *Agreement between the United States, the Nebraska Game and Parks Commission, and the Mirage Flats Irrigation District to Raise the Minimum Reservoir Level in Box Butte Reservoir*, as amended.

1.5 Scoping Issues

Public involvement and agency coordination are required as part of the NEPA process, to the extent practicable. Public involvement typically begins with scoping, which often highlights issues which should be analyzed in depth in the EA. For this project, public scoping activities began in earnest on July 28th, 2015, when Reclamation hosted an informational public meeting in Alliance, Nebraska. Details of the scoping effort and other public and agency involvement are included in Chapter 5. All public and agency comments received and the rational for issue determinations are included in the project record. During the meeting, concerns were raised relating to increased construction traffic and potential road closures.

Based upon information obtained through scoping, discussion with interested and affected parties, and existing laws and regulations, Reclamation identified a number of potentially relevant resources, each of which will be addressed in detail in Chapter 3.

Chapter 2: Description of Alternatives

This chapter describes all practical and reasonable alternatives developed to meet the purpose and need, as defined in the previous chapter. These alternatives were developed according to the NEPA §102(2)(E) requirements, which directs Federal agencies to "study, develop, and describe appropriate alternatives to recommend courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources."

2.1 Alternatives Considered in Detail

The alternatives that are considered in this EA are:

- No Action Alternative (Alternative 0),
- Toe Drain Replacement (Alternatives 1.A, 1.B., and 1.C.), and
- Reservoir Restriction (3,995 feet) (Alternative 2).

In Chapter 3, the effects of each alternative on human health and the environmental will be evaluated. This evaluation will provide an informed basis for choice among the project alternatives available for the decision maker and the public.

2.1.1 Alternative 0: No Action

Under this alternative, no Federal action would be taken to correct safety deficiencies at Box Butte Dam. Instead, careful monitoring of the reservoir inflows, outflows, and elevation would continue. High reservoir elevations would require diligent monitoring of the seepage at the toe of the dam to provide early notice of signs of dam failure. Reclamation would likely operate the reservoir at a lower elevation to reduce the amount of seepage and internal erosion associated with higher water levels, but this would not provide a permanent solution to the structural issues that exist. The seepage and internal erosion would continue. In instances of the reservoir rising to a "critical or threshold elevation," the dam could potentially fail in a variety of ways (Reclamation 2015b). In a dam failure situation, the following would be expected according to Reclamation (2015b):

> Extreme flood or dam break discharges would inundate scattered ranches and farmsteads along the Niobrara River in Dawes, Sheridan, and Cherry Counties. About 5 occupied houses would be seriously damaged, and another 4 might be exposed to 0 to 5 feet of water. One major highway, four well-traveled State roads, and several dirt roads cross the river in the first 92 river miles downstream from Box Butte Dam. The first few bridges would likely be destroyed, and several more would be inundated and severely damaged if not destroyed. The Niobrara River eventually flows into the Missouri River much farther downstream (over 250 miles), but flood discharge attenuation would reduce the threat to infrastructure and property before flood waters travel that distance. The time it [would take] for the maximum discharge to reach river mile 92 is about 50 hours.

This situation would put an estimated population of 105 people at risk, with potential loss of zero to two lives. Loss of life would most likely be due to people encountering flooded road crossings while driving at night (Reclamation 2015b).

Due to the risks to property and public safety, this alternative would not satisfy the purpose and need for the project. Although this alternative does not satisfy the purpose and need, it was carried forward for additional discussion and analysis in accordance with the guidance presented in Reclamation's NEPA Handbook (Reclamation 2012a).

2.1.2 Alternative 1: Toe Drain Replacement (Preferred Alternative)

This alternative would remove the existing toe drain system and replace it with a new two-stage filter and drainage system. The new toe drain would be larger than the existing drain, using a 12-inch to 24-inch diameter drain pipe with perforations, and backfilled with a two-stage filter and drain envelope. The new drains would be installed along the entire toe of the dam. Sediment collection structures and weirs for measuring discharge would be installed in order to monitor seepage and material transport.

This alternative includes several sub-alternatives, or "plus" alternatives. The sub-alternatives are not required components of Alternative 1, but are optional components which could provide additional benefits or cost savings.

Alternative 1.A: Plus seepage berm

In addition to the activities described in Alternative 1, Alternative 1.A would include an additional seepage berm to further reduce risks associated with a potential blowout near the dam toe. The berm would be constructed at the toe of the dam and extend 60 feet downstream.

Alternative 1.B: Plus vertical drainage trench

In addition to the activities described in Alternative 1, Alternative 1.B would include a 15-foot deep vertical drainage trench immediately downstream of the existing toe drain and centered beneath the new toe drain. The vertical drainage trench would provide additional risk reduction.

Alternative 1.C: Partial toe drain replacement (Lowest Cost Alternative)

This alternative would replace the toe drain only on the right side of the dam, also called the dike, where the existing cutoff trench beneath the embankment does not extend to bedrock. This alternative would require filling the existing toe drain pipe with filter sand to eliminate any material migration into the toe drain system. This alternative is the "lowest cost alternative," meaning it is the lowest cost alternative which is still capable of reducing the risks below the established guidelines.

Other key components of Alternative 1, including any plus alternatives, are described in further detail below:

Road and Recreation Closures: Access over the dam would be closed to the public for the duration of construction (expected duration is 13 months), with the exception of obtaining access to a single private residence located on the left dam abutment and Nebraska Game and Parks Commission (NGPC) management activities. Temporary/intermittent closures of the main entrance road (Box Butte State Recreation Area Road) may occur during intensive construction periods. Reclamation would provide public notification of road closures at least 30 days in advance of such closures.

The campground located just north of the spillway would remain open for the duration of the project, although access to the site would be available from the northern access (River Road) point only. The Wildlife Management Area (WMA), operated by NGPC, at the south end of the dam would not be accessible by vehicle but would remain accessible via boat.

Main Work Area: The main work area, including staging and stockpiling areas, would extend 100 feet downstream of the dam and encompass 61.5 acres. Trees and other vegetation would be removed in these areas to provide workspace for construction operations. Access to the main work area would be directly from Box Butte State Recreation Area Road and two new temporary access roads running east from Table Center Road. The temporary access roads would be roughly 100 feet wide and would be abandoned following completion of construction.

Borrow Areas: Borrow areas would be located on the left and right abutments. The borrow areas measure 27.6 acres. An estimated 76,000 cubic yards of earthfill material would be excavated and processed for use. Both borrow areas were utilized during the original construction of the dam.

Restoration: Site preparation would require tree removal, vegetation clearing, and topsoil striping. The contractor would be required to restore all disturbed areas, including temporary staging and stockpiling areas, borrow areas, haul roads, and abandoned road segments.

Reservoir Elevation: During construction, the reservoir would be temporarily restricted to an elevation of 3,985 feet. The MFID would likely draw down the reservoir pool to an elevation of 3,979 feet by the end of the irrigation season (early September). Normal fall and early winter inflows would be stored, filling the reservoir pool to an elevation of 3,985 feet (mid- to late-December). Depending on the amount of seepage through the dam and reservoir water levels during the construction period, releases through Box Butte Dam may be required to maintain an elevation of 3,985 feet. This lower surface elevation is needed in order to limit seepage in the construction area. Any reservoir elevation would be staged to meet the needs for irrigation water while minimizing the need for dewatering in the construction area.

Utility Relocation: An existing power line near the spillway would be realigned onto the road crossing the crest of the dam. At this time, it is unknown whether the power line would be buried or retained as an overhead line.

Stream Crossing: One of the temporary access routes would require crossing the Niobrara River downstream of the dam. Through consultation with the NGPC, the stream crossing has been designed to be fish-friendly, with a no-slope culvert and countersunk to allow natural substrate to settle to the bottom of the culvert, all of which would avoid the creation of an elevation barrier to fish movement.

Wetland Mitigation: The main work area and temporary site access overlap with 0.6 acres of wetlands. Because there would be unavoidable impacts to these wetlands, Clean Water Act permitting and mitigation would be required prior to undertaking project activities. The

application and permit process would determine appropriate mitigation and compensation measures.

Construction for Alternative 1 would begin in the summer of 2017 and concluding by the fall of 2018. All project activities would occur on Federal lands, primarily within Reclamation's operations and maintenance area on the downstream side of Box Butte Dam. Figure 3 illustrates the location of major work components of this alternative. Table 2 provides a breakdown of estimated costs for Alternative 1, including "plus" alternatives.

Table 2: Alternative 1 Estimated Costs

Alternative	Total Cost
1 (Toe Drain Replacement)	9.8 million
1.A (Plus Seepage Berm)	17.7 million
1.B (Plus Vertical Drainage Trench)	21.5 million
1.C (Partial Toe Drain Replacement)	8.1 million

This alternative, including any of the "plus" alternatives, would satisfy the purpose and need and was carried forward for additional discussion and analysis.

2.1.3 Alternative 2: Reservoir Restriction (3,995 feet)

For this alternative, a permanent reservoir restriction of 3,995 feet would be implemented at Box Butte Dam. The outlet works gates would be operated such that the reservoir stays in a drawn-down state. This would reduce static risks and also reduces the risks from flood loadings. Seeding would be required to stabilize the reservoir between elevations 3,995 feet and 4,000 feet where drawdown has occurred. At elevation 4,007 feet, Box Butte Reservoir measures roughly 1,537 acres in size with 14 miles of shoreline. At elevation 3,994.91 feet, Box Butte Reservoir would measure roughly 916.8 acres in size, resulting in a reduction of 620.2 acres (approximately) of reservoir area.

On an annual basis, MFID uses approximately 12,000 AF of Box Butte Reservoir. Given that the reservoir can hold approximately 13,292 AF of water at elevation 3,995 feet, this alternative would not inhibit the delivery of project water from the reservoir. MFID would also be in compliance with their agreement with NGPC to maintain a reservoir elevation of 3,979 feet or greater.

The estimated cost of this alternative is $7 million. This alternative would satisfy the purpose and need and was carried forward for additional discussion and analysis.

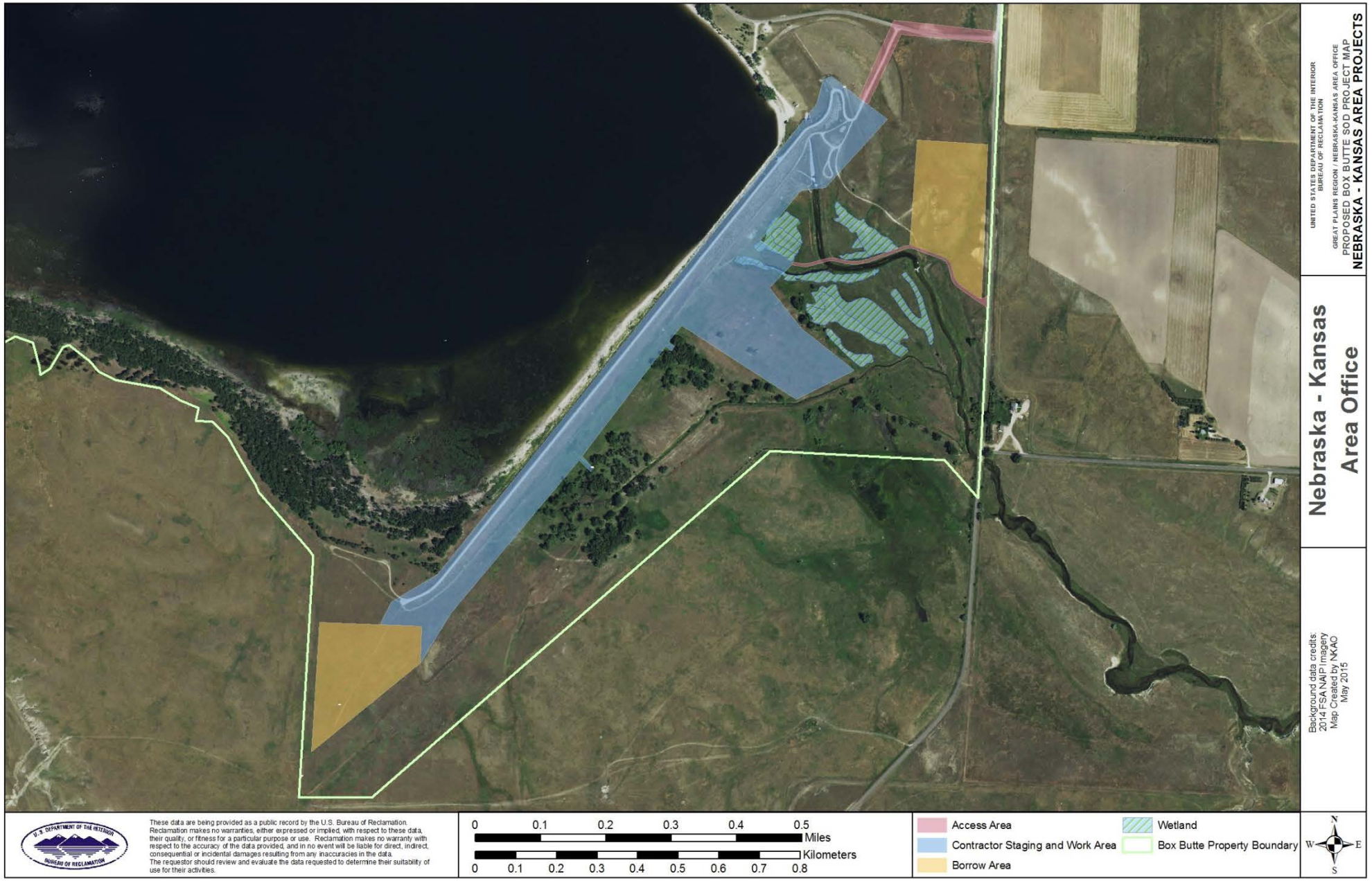

Figure 3: Action Alternatives Footprint

2.2 Alternatives Dropped from Detailed Consideration

The following alternatives were considered but dropped from detailed evaluation because they do not meet the purpose or need described in Chapter 1.4 ("Purpose and Need for the Action"):

- Reservoir Restriction (Alternative 3)
- Dam Breach (Alternative 4)

2.2.1 Alternative 3: Reservoir Restriction (3,985 feet)

For this alternative, a permanent reservoir restriction of 3,985 feet would be implemented at Box Butte Dam. The outlet works gates would be operated such that the reservoir stays in a drawn-down state. This would reduce static risks and also reduces the risks from flood loadings. Seeding would be required to stabilize the reservoir between elevations 3,985 and 4,000 feet where drawdown has occurred.

On an annual basis MFID uses approximately 12,000 AF of Box Butte Reservoir. Given that the reservoir can only hold approximately 5,316 AF of water at elevation 3,985 feet, this alternative would inhibit the delivery of approximately 60% of the project water from the reservoir. If this reservoir restriction alternative was implemented, the MFID may need to eliminate their agreement and drawdown the reservoir to the dead pool elevation (3976.5 feet) to meet their irrigation delivery requirements, which is in violation of the MFID's agreement with the NGPC to maintain a reservoir elevation of 3,979 feet or greater.

The estimated cost of this alternative is $20.8 million. The reservoir restriction alternative would result in a loss of project benefits and thus, is unable to satisfy the purpose and need. As a result, this alternative was not carried forward for additional discussion and analysis.

2.2.2 Alternative 4: Dam Breach

This alternative would involve lowering the reservoir water surface to the original river channel elevation (3,955 feet) and breaching a section through the existing dam. The bottom of the breach would be 255 feet wide in order to safely pass the 1,000 year return period flood event without significant storage. Riprap removed from the breach excavation would be placed within the new river channel and side slopes. The river channel upstream of the dam has already likely partially filled with sediment. The sediment would need to be removed to re-establish the river and the sediment would be placed within the reservoir area. It is assumed that the channel would have to be excavated back at least one mile to re-establish the river course. Drainage channels that currently discharge into the reservoir around the reservoir rim would have to be re-established and protected to adequately convey water to the river. The auxiliary spillway, service spillway, and outlet works stilling basin and discharge channel would be abandoned by placing fill over the structures to match the existing topography and aesthetic appearance. The control house on the dam crest would be demolished. Post breach, the reservoir area would need to be reclaimed and rehabilitated.

The estimated cost of this alternative is $45.1 million. This alterative would likely provide some fish, wildlife, and recreation benefits, however, implementation of this alternative would eliminate irrigation project benefits. As such, this alternative does not fully meet the purpose and need and was not carried forward for additional discussion and analysis.

Chapter 3: Affected Environment and Environmental Consequences

This chapter summarizes human activities and existing environmental conditions within the project area, as they pertain to the key issues. Environmental consequences have been integrated with the affected environment to show the degree of potential impacts to individual resources; these impacts may either be positive (beneficial) or negative (adverse), and permanent (long-term) or temporary (short-term) in nature.

3.1 General Project Location

Box Butte Dam is located in the Shortgrass Prairie ecoregion of the Great Plains (Chapman et. al. 2001), also referred to as the Western High Plains ecoregion (Bailey et. al 1994). The ecoregion is located in the rain shadow of the Rocky Mountains, along the western edge of Nebraska. The ecoregion supports a variety of vegetation types in addition to shortgrass prairie, such as pinewood lands, badlands, and mixedgrass prairie. The general topography of the ecoregion is flat tablelands, with pockets of rocky escarpments and rough terrain in areas which have been eroded by the Niobrara River. Soils in the ecoregion are typically fine sands and silty loams which have been formed from weathered sandstone.

3.2 Climatic Conditions

DOI Secretarial Order No. 3289 directs Reclamation to "consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multi-year management plans, and making major decisions regarding potential use of resources."

Climate change is analyzed in two ways: first, whether Reclamation's action is a potentially significant contributor to climate change and second, what effects climate change may have upon the proposed action.

3.2.1 Existing Conditions

The Great Plains has a continental climate marked by cold winters, hot summers, and relatively low humidity. Annual precipitation in the project area ranges from 12 to 17 inches (Bailey et. al 1994). The frost-free period is an average of about 142 days. In the summer, daytime temperatures range around 90° Fahrenheit (F) with moderate summer nights. In the winter, average daytime temperatures are in the low teens in mid-winter with persistent winds (Reclamation 2008). Temperature extremes on record are -37°F and 110°F. January is the coldest month with an average daily temperate of 24° F, while July is the hottest month with an average temperature of 74° F (Reclamation 2008).

Near Box Butte Reservoir, annual precipitation averages 18.2 inches, 80 percent of which occurs during the growing season of April through September (Reclamation 2008). Precipitation is generally light in the winter and commonly falls as light snow. Occasionally there is heavy snow and persistently cold weather.

The prevailing winds are from the south and southeast during the spring and summer months, and from the north and northwest during the remainder of the year. Tornadoes have occurred in the general vicinity, but are generally rare.

Future Climatic Conditions

Nebraska has experience an overall warming trend of 1° F since 1895 and assessments of future climate indicates the warming trend will continue, with the vast majority of warming occurring during the winter months; temperatures may increase by 4-5° F (low emissions scenarios) to 8-9° F (high emissions scenarios) by the end of the century (University of Nebraska-Lincoln 2014). Since 1895, the length of frost-free days has increased by 5 to 25 days and on average across the state, by more than one week. The trend in longer frost-free seasons is expected to continue.

Although annual precipitation is expected to remain steady, very heavy precipitation events, primarily in the form of heavy rainfall events, are expected to increase (University of Nebraska-Lincoln 2014). Increased spring warming and intense rainfall are likely to result in increased flooding.

It is expected that drought frequency and severity would increase, particularly during the summer months, because of the combination of increasing temperatures and the increased seasonal variability in precipitation that is likely to occur. Additionally, soil moisture content is expected to decrease by 5% to 10% (depending upon the emissions scenario), further increasing drought conditions (University of Nebraska-Lincoln 2014).

3.2.2 Environmental Effects

Alternative 0: No Action

Direct, Indirect, and Cumulative Effects

This alternative would have no effect on local climate conditions. The projected increase in flooding and heavy precipitation events would likely result in increased reservoir elevations. If reservoir elevations exceeded Reclamation's threshold level, Reclamation's obligation to take risk reduction activities at Box Butte Dam would escalate.

Alternative 1: Toe Drain Replacement (Preferred Alternative)

Direct, Indirect, and Cumulative Effects

The construction activities associated with this alternative, such as operation of heavy machinery, would result in short-term emissions of greenhouse gases. In order to minimize greenhouse gas emissions, only equipment and vehicles which meet state and federal emissions guidelines would be utilized during project activities. If equipment or vehicles show signs of excessive emissions, they would not be operated until corrective repairs or adjustments are taken to reduce emissions to within guidelines. Additionally, all equipment and vehicles would be powered off when not in use.

While this alternative would result in greenhouse gas emissions, these emissions would not measurably impact the local climate. This alternative would correct design deficiencies at Box Butte Dam, making this facility better positioned to respond to future climate changes.

Alternative 2: Reservoir Restriction (3,995 feet)

Direct, Indirect, and Cumulative Effects

This alternative would have no effect on local climate conditions. The projected increase in flooding and heavy precipitation events would likely result in increased reservoir elevations, which would lead to increased releases from the reservoir in order to maintain an elevation of 3,995 feet.

3.3 Soils

Soil classification systems have been developed to provide general information about the nature of a soil found in a particular location. The U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) manages the U.S. Soil Classification System. This system is a hierarchical system with six levels of classification: orders, suborders, great groups, subgroups, families, and series. The NRCS system recognizes approximately 15,000 individual soil series in the U.S.

The 1981 Farmland Protection Policy Act 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 Farmlands of State Importance.

3.3.1 Existing Conditions

Soils in the general area range from deep silt loams in the areas along the north side of the reservoir to fine sands along the south side with gravelly sandy loams below the dam. Top soils contain only small amounts of organic matter and are shallow in numerous areas and completely removed by erosion or excavation in other areas (Reclamation 2008). See Table 3 for detailed descriptions of the soil types present in the project area.

Table 3: Box Butte Reservoir Soil Descriptions

Soil Type	Description
Alliance loam	Deep, well-drained upland soil formed in material weathered from sandstone. Suited to dryland and irrigated crops and tree and shrubs for wildlife habitat.
Busher loam	Deep, well-drained to excessively drained soil formed in material weathered from sandstone. Mainly found in native grass rangelands. Suited for irrigated cropland and tree and shrubs for wildlife habitat.
Las Animas soils	Deep, moderately wet bottomland soils with a coarse textured surface and subsoils developed in recent stream deposited material.
Schamber soils	Shallow, excessively drained soils that occupy escarpments of stream terraces along the Niobrara River. Not suited to cultivated crops, better suited to rangelands.
Valent and Dwyer loam	Deep, excessively-drained upland soil formed in wind deposited sands. Valent soils mainly on uplands and along major drainage-ways.
Vetal and Bayard soils	Deep, well-drained soil formed in sandy alluviam on slight slopes and stream terraces. Suited to both dryland and irrigated crops. Also suited to grass, trees, and shrubs for wildlife habitat and recreation
Bigwinder soils	Very deep, poorly drained, moderately permeable soils formed on

	flood plains and low stream terraces. Slopes range from 0 to 3 percent. These soils frequently flood for brief durations during spring months and a water table is present at a depth of one to three feet in the months of April through August.

There are no farmlands classified as Prime, Prime if Irrigated, or Farmlands of State Importance within the project area (NRCS 2015).

The erosion potential of soils within the project area is primarily rated "slight," with a few areas of "moderate" (NRCS 2015). A rating of "slight" indicates that erosion is unlikely under ordinary conditions; a rating of "moderate" indicates that some erosion is likely and that erosion control measures may be needed.

Using aerial imagery and site visits, the area below Box Butte Dam shows evidence of alternations consistent with dam construction. Some areas have had material removed, while other areas have had materials deposited. Berms have been created that run along portions of the Niobrara River and along the outlet channel that is fed by the toe drains out of the dam. Other berms occur in several places in the bottomland that do not seem to have any relationship to the natural hydrology of the area.

3.3.2 Environmental Effects

Alternative 0: No Action

Direct, Indirect, and Cumulative Effects

Under the No Action alternative, no construction would occur at Box Butte Dam. There would be no direct soil erosion or sedimentation effects resulting from project construction activities. Sedimentation resulting from seepage through Box Butte Dam would continue.

Alternative 1: Toe Drain Replacement (Preferred Alternative)

Direct, Indirect, and Cumulative Effects

This alternative would result in soil disturbance to a maximum of 89.1 acres, which encompasses the entire construction area, staging/stockpiling areas, temporary access routes, and borrow sites.

Site preparation activities (reservoir elevation restriction, tree removal, clearing of vegetation, and stripping and stockpiling topsoil) would result in exposed soils and increased erosion. The use of heavy equipment would likely increase soil compaction and, as a result, increased surface water runoff and potential for erosion. The proposed staging and stockpiling areas, borrow areas, and haul roads would be located in areas with gentle slopes (0 to 3%) where erosion potential is slight. Use of the borrow areas would result in disturbance to topsoil and alluvial materials, both of which have been previously disturbed during original construction of the dam.

Implementation of the following required mitigation measures would minimize the potential impacts on soil resources:

1. Development and implementation of a Storm Water Pollution Prevention Plan (SWPPP) would be required. The SWPPP would address specific erosion and sedimentation prevention and control measures needed to protect soils during construction.

2. Areas where ground disturbance would occur would be identified in advance of construction and limited to only those areas that are necessary to complete project work. Bare soil would be kept to the minimum required by designs.
3. Storm water runoff origination on upslope areas would be diverted away from disturbed areas. Runoff on bare ground would be dispersed to reduce concentrated flows that might lead to erosion and sedimentation.
4. All vehicular construction traffic would be confined to the designated access routes and staging areas.
5. The selected contractor would be required to restore and revegetate all disturbed areas. Restoration measures would include contouring and grading, planting erosion control grass species for temporary revegetation, and permanent revegetation efforts utilizing a Reclamation-approved seed mix.

With the implementation of the above described measures, effects to soil resources are expected to be both short-term and minor in nature.

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
The reservoir drawdown proposed in Alternative 2 has potential to impact soils. At elevation 3,995, an additional 620 acres of land would be newly exposed. Exposure of non-vegetated soils between elevations 3,995 and 4,000 feet is almost certain to result in increased sedimentation and erosion. In order to minimize these effects, extensive seeding efforts would be undertaken in the exposed areas to provide stabilization until permanent vegetation is established. The permanent revegetation efforts would utilize a Reclamation-approved seed mix. With the implementation of seeding efforts, this alternative would have temporary impacts to soils.

3.4 Cultural Resources, Indian Trust Assets, and Paleontological Resources

Cultural resources encompass sites, objects, or practices of archaeological, historical, cultural and religious significance that are protected under various laws and regulations:

- Section 106 of the National Historic Preservation Act (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 National Register of Historic Places (NRHP). Federal agencies must consult with State or Tribal Historic Preservation Officers (SHPO or THPO) who are responsible for administering NHPA programs at the state or tribal level.

- Secretarial Order 3175 and Reclamation Policy require that Reclamation evaluate and asses impacts of a proposed project on Indian Trust Assets (ITAs). ITAs are legal interests in property held in trust by the United States Government for Indian Tribes, Nations, or individuals. The Secretary is the trustee for the United States on behalf of Indian Tribes. All DOI agencies share the Secretary's duty to act responsibly to protect and maintain ITAs reserved by or granted to Indian tribes, Nations, or individuals by treaties, statutes, and executive orders (E.O.). Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights. As assets held in trust, ITAs cannot be sold,

leased, or otherwise alienated without federal approval. When adverse impacts to an ITA cannot be avoided, appropriate mitigation or compensation are required.

- The Native American Graves Protection and Repatriation Act (NAGPRA) requires that Native American cultural items be returned to lineal descendants and/or culturally affiliated Indian tribes. Cultural items include human remains, funerary objects, sacred objects, and objects of cultural patrimony. NAGPRA also establishes procedures for the inadvertent discovery of Native American cultural items on federal or tribal lands and makes it a criminal offense to traffic in Native American human remains without right of possession or if cultural items were obtained in violation of the act. NAGPRA applies to all projects, regardless of the funding source.

- The 2009 Paleontological Resources Preservation Act (P.L. 111-011 Title VI Subtitle D) directs federal agencies to manage, protect, and preserve paleontological resources.

3.4.1 Existing Conditions

In August 1946, the Smithsonian Institution's Missouri River Basin Surveys conducted archeological and paleontological surveys of the Box Butte Reservoir area. The study discovered one archeological site and no paleontological sites (Bauxar 1947). The archeological site recorded is of prehistoric origin with an unknown cultural affiliation containing a scatter of lithic and faunal remains. Since 1946, several small scale survey projects have been conducted in association with other construction projects at Box Butte Dam and Reservoir. These small surveys have led to the discovery of one additional site containing a prehistoric component. Presently, there are no sites in the project area on or nominated to the NRHP.

In the mid 1990's, Reclamation undertook an investigation of potential ITAs within the Republic River Basin. During this investigation, more than 40 treaties, E.O.s, and legislative documents regarding the Kansa, Pawnee, Northern Cheyenne, Northern Arapahoe, Potawatomi, Wyandot, Delaware, Chippewa, Seneca, Mixed Seneca, Shawnee, and Quapaw Tribes were reviewed to determine whether potential ITAs were present in the Republican River Basin. Based upon this investigation, Reclamation determined that there are no ITAs in or affected by the Republican River Basin or its reservoirs, including Box Butte Dam and Reservoir.

Most recently, the project area received a complete cultural resource survey as part of a project conducted by Dr. Alan Osborn and the University of Nebraska State Museum. This report was reviewed by the Nebraska SHPO and no archeological sites were discovered (Osborn 2009).

Paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds), therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources. Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a high class number indicated a higher potential.

The entire project area is classified within the Ogallala Group or Formation (Burchett 1986). The geologic ages within in this formation include Phanerozoic (542 million years ago),

Cenozoic (65.5 million years ago), Tertiary (66 to 2.58 million years ago), and Miocene (23.03 to 5.332 million years ago). The major rock composition of the formation is sedimentary conglomerate-sandstones and siltstone-mudstones. Many features of the Ogallala Formation remain unknown and the formation has not yet been classified in the PFYC. As such, a Class 3b (Unknown Potential) is assumed. Class 3b is used for units which exhibit geologic features and preservation conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. Class 3b may indicate the unit or area is poorly studied and surface-disturbing activities may require field assessment to determine appropriate course of action.

3.4.2 Environmental Effects

Alternative 0: No Action
Direct, Indirect, and Cumulative Effects
The No Action alternative does not involve construction work or soil disturbing activities and there are no ITAs in the project area. Thus, this alternative would have no effect on cultural resources, paleontological resources, or ITAs.

Alternative 1: Toe Drain Replacement (Preferred Alternative)
Direct, Indirect, and Cumulative Effects
Based upon the information collected during previous surveys and investigations, Reclamation determined that the proposed action was unlikely to impact any cultural resources listed on the NRHP or eligible for such a listing. The Nebraska SHPO was consulted and concurred with Reclamation's *finding of no historic properties affected* and recommended that no further archeological surveys are necessary (SHPO 2015).

There are no known ITAs in the project area. Although the paleontological potential of the area is unknown, prior construction activities in the project location make it unlikely that previously undisturbed significant paleontological resources would be impacted by the proposed action.

Because this alternative includes soil-disturbing activities, there is potential for encountering unknown cultural or paleontological materials during construction actions. If unknown cultural or paleontological resources were discovered during construction activities, construction would be halted until Reclamation's Nebraska-Kansas Area Office archeologist is notified and appropriate consultations are completed.

This alternative is unlikely to affect cultural resources, ITAs, or paleontological resources at Box Butte Dam or within the project area.

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
While this alternative would not impact known cultural resources, ITAs, or paleontological resources, there is potential for impacts to undiscovered resources which may be exposed after the reservoir has been drawdown. If unknown cultural or paleontological resources were discovered during drawdown, Reclamation's Nebraska-Kansas Area Office archeologist shall be notified and appropriate consultations shall be completed.

This alternative is unlikely to affect cultural resources, ITAs, or paleontological resources.

3.5 Water Resources

The Clean Water Act (CWA) of 1977, as amended, was enacted to restore and protect the chemical, physical, and biological integrity of the nation's waters. The CWA gives the U.S. Environmental Protection Agency (EPA) authority to establish water quality standards, control discharges into surface and ground waters, and issue permits for discharges (Section 402, also known as the National Pollutant Discharge Elimination System (NPDES). The U.S. Army Corps of Engineers regulates the discharge of dredged or fill material into waters of the United States, which includes some types of wetlands (Section 404). Section 303(d) of the CWA requires States and tribes to identify water bodies that do not meet established water quality standards and to publish a list of these impaired waters every 2 years. For water bodies on this list, States must develop water quality improvement plans referred to as total maximum daily loads.

E.O. 11990 (Protection of Wetlands) dictates that Federal agencies shall avoid, to the extent possible, the long and short term adverse impacts associated with the destruction or modification of wetlands and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. If Federal agencies cannot avoid the destruction or modification of wetlands, then appropriate mitigation and compensation measures must be undertaken, in addition to compliance with permitting requirements (Section 404 of the CWA).

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542) was created to preserve certain rivers which have outstanding nature, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Rivers may be designated by Congress or the Secretary of the Interior and may include an entire river length, segments, or tributaries.

3.5.1 Existing Conditions

Box Butte Reservoir is a multi-purpose reservoir which provides irrigation, recreation, and fish and wildlife benefits. The reservoir has a shoreline length of approximately 14 miles with a water surface area of 1,537 acres. The reservoir capacity includes 188 AF of dead storage, 2,204 AF of inactive storage, 27,769 AF for irrigation. There is no flood control pool at Box Butte Reservoir. An agreement between MFID and NGPC requires a minimum reservoir elevation of 3,979 feet or greater to ensure recreation and fish and wildlife benefits are provided.

The Niobrara River originates in Wyoming and flows in an easterly direction to Box Butte Reservoir, about 135 miles downstream for its origin. The proposed project location is approximately 140 miles upstream of the congressionally-designated Niobrara National Scenic River, which was designated under the Wild and Scenic Rivers Act for its free-flowing condition, water quality, and scenic, recreational, fish and wildlife, and paleontological values.

Based upon information from the National Wetlands Inventory (NWI), the portion of the project area downstream of Box Butte Dam is dominated by freshwater emergent wetlands (USFWS 2015). A wetland delineation, completed in early 2015, found that some of the areas identified as wetlands by the NWI were likely not wetlands, but were instead micro-environments of upland communities interspersed within wetland communities (Reclamation 2015c). The project site exhibited areas of emergent wetlands characterized by the presence of cattails and a variety

of sedges, rushes, and spikerushes, as well as non-native species such as smooth brome and Kentucky blue grass (Reclamation 2015c). The follow types of wetlands were identified within the 13 acre delineation area:

Table 4: Wetland Classifications

Wetland System/Class	Water Regime	Acres
Palustrine Emergent	Temporarily flooded	5.73
Palustrine Emergent	Seasonally flooded	0.44
Palustrine Emergent	Semi-permanently flooded	5.74
Palustrine Scrub-Scrub	Seasonally flooded and diked/impounded	0.14
	Total Wetlands	**12.05**

The hydrology of the wetland sites is not well understood, given the alterations to hydrology as a result of the adjacent dam. Groundwater from the Niobrara River is declining and much of the instream flow is removed before it reaches the bottomlands below Box Butte Dam, while seepage from the dam and several recent years of above-average precipitation have been supporting wetlands.

Box Butte Reservoir and the Niobrara River downstream of the dam are listed as impaired water bodies under Section 303(d) of the CWA. Box Butte Reservoir is classified as impaired because of pH. Fish consumption advisories are in place for northern pike due to concerns regarding mercury (NDEQ 2013; EPA 2012). For roughly nine miles downstream of Box Butte Dam, the recreation use of the Niobrara River is classified as impaired due to pathogens (E. Coli) (NDEQ 2013; EPA 2012).

3.5.2 Environmental Effects

Alternative 0: No Action

Direct, Indirect, and Cumulative Effects

Under the No Action alternative, no construction would occur at Box Butte Dam. Reclamation would operate the dam at a lower reservoir elevation to reduce seepage through the dam, which in turn, may slightly reduce the occurrence of seepage wetlands below the dam. The ability to meet water delivery commitments would not be impacted and hydrology would remain within the range of historical operations.

While sedimentation through the dam is expected to continue, the No Action alternative would not impact water quality classifications or the identified sources of contamination.

Alternative 1: Toe Drain Replacement (Preferred Alternative)

Direct, Indirect, and Cumulative Effects

The project would not contribute to Section 303(d) sources of contamination in either Box Butte Reservoir or the Niobrara River downstream of the dam (pH, pathogens, or mercury). This alternative would not result in long-term changes in the normal operation of the dam and reservoir. The reservoir would be operated at an elevation of 3,985 feet for the duration of construction activities, which is anticipated to be 13 months. Minimum releases to the Niobrara River downstream of the dam would continue during the construction phase.

Although the exact hydrologic source is not known, wetlands below Box Butte Dam are likely hydrologically connected to the water seeping through the dam. This alternative would not eliminate seepage through Box Butte Dam entirely, but would limit the amount of sediment contained in the seepage and reduce overall seepage. Less than one acre (0.6 acres) of wetlands would be permanently impacted by this alternative. Due to the permanent impacts to wetlands, a CWA (Section 404) permit would be necessary. The Section 404 application and permitting process would determine appropriate mitigation measures to compensate for the loss of wetlands as a result of this alternative. By acquiring and complying with all appropriate CWA permits, impacts to wetlands as a result of this alterative would be minor.

Through consultation with the National Park Service, it was determined that, due to the project location, there would be a negligible effect on the free-flowing condition, water quality, and scenic, recreational, fish and wildlife, and paleontological values of the Niobrara National Scenic River (National Park Service 2015) as a result of this alternative.

Various project activities (vegetation clearing, topsoil stripping, excavation from borrow areas, construction of temporary haul routes) could result in the introduction of pollutants (sediment) into stormwater runoff. Due to the potential for introduction of pollutants into waters of the U.S., an NPDES permit would be required. The potential impacts resulting for sedimentation would be minimized or eliminated through the development and implementation of a SWPPP plan, which would outline measures to control water discharge, runoff, erosion, and sediment discharge. Sediment control measures may include silt fences, fiber rolls certified as weed-free, sediment traps, and other sediment filters as needed to protect waters, drainages and wetlands. Hazardous materials would be stored at least 100 feet away from receiving waters and vehicle refueling and maintenance would be performed at least 100 feet from receiving waters. Used cumulatively, these measures would eliminate or reduce sediment reaching waters of the U.S.

Alternative 2: Reservoir Restriction (3,995 feet)

Direct, Indirect, and Cumulative Effects

At a lower reservoir elevation, seepage through Box Butte Dam may be reduced. As a result, the occurrence of seepage wetlands below the dam may also be reduced. The ability to meet water delivery commitments would not be impacted and hydrology would remain within the range of historical operations.

Runoff from newly exposed soils could decrease water quality within Box Butte Reservoir by increasing turbidity and reducing dissolved oxygen. Sediment control measures would be utilized until permanent revegetation efforts could be completed. Measures may include silt fences, fiber rolls certified as weed-free, sediment traps, and other sediment filters as needed to protect waters, drainages and wetlands. Due to the potential for introduction of pollutants (sediment) into waters of the U.S., an NPDES permit would be required.

3.6 Air Quality

Under the 1990 Clean Air Act, limits are set on the quantities of particular pollutions that can be in the air anywhere in the United States. This law is meant to ensure that all Americans have the same basic health and environmental protections. Individual states are allowed to have more

restrictive air standards but they are not allowed to have less stringent standards than those set by the EPA.

The EPA has established two types of national ambient air quality standards (NAAQS). Primary standards provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. NAAQSs are set for six principal pollutants, which are called "criteria" pollutants, and represent the maximum levels of criteria pollutants that are considered acceptable. The EPA also designates all areas of the U.S. as having air quality better than (attainment) or worse than (non-attainment) the NAAQS. When there is insufficient ambient air quality data for the EPA to form a basis for attainment status, the area is designate "unclassified." Areas that were once in nonattainment and now meet NAAQS are designated "maintenance areas."

The Nebraska Fugitive Dust Regulations (Nebraska Title 129, Chapter 32) apply to all construction and/or excavation activities.

3.6.1 Existing Conditions

The Nebraska Department of Environmental Quality (NDEQ) regularly monitors NAAQS by means of thirty air quality monitors at twenty six locations throughout the state. All areas within Nebraska are currently in attainment of NAAQS (NDEQ 2014). Data regarding air quality in the project area is sparse. Even with the limited data available, generally, the air quality appears to be better than the statewide air quality. This may be due to a lack of large metropolitan areas in the project area.

3.6.2 Environmental Effects

Alternative 0: No Action

Direct, Indirect, and Cumulative Effects

This alternative would have no effect on air quality conditions or trends in Dawes County, Nebraska.

Alternative 1: Toe Drain Replacement (Preferred Alternative)

Direct, Indirect, and Cumulative Effects

Air quality impacts from this alternative would be localized in nature and decrease with distance from the project site. Construction emissions would vary from day to day, depending on the timing and intensity of construction, as well as wind speed and direction. The primary sources of emissions would be from operation of on-site construction equipment and fugitive dust.

The following best management practices would be implemented in order to minimize emissions and other impacts to air quality as a result of project activity:

- All material excavated, stockpiled, or graded would be sufficiently watered, treated, or covered to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard.
- All areas with vehicle traffic would be watered or have dust palliative applied as necessary to control dust emissions.

- All on-site vehicle traffic would be limited to a speed of 15 miles per hour on unpaved roads.
- All land clearing, grading, earth moving, or excavation activities on a project would be suspended as necessary to prevent excessive windblown dust when winds are expected to exceed 20 miles per hour.
- All equipment would be powered off when not in use and maintained in accordance with industry emissions standards. Equipment and vehicles that show excessive exhaust gas emissions would not be operated until corrective repairs or adjustments are taken to reduce such emissions to acceptable levels.
- Compliance with Nebraska Fugitive Dust Regulations (Title 129 - Nebraska Air Quality Regulations, Chapter 32 - Dust; Duty to Prevent Escape.)

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
This alternative would have no effect on air quality conditions or trends in Dawes County, Nebraska.

3.7 Land Use and Vegetation

The Soil and Moisture Conservation Act and the Federal Noxious Weed Act require Federal Agencies to develop a program to control undesirable plants on lands under its jurisdiction. Noxious weeds can potentially render lands unfit for beneficial uses.

Under Section 7 of the Endangered Species Act of 1973 (ESA), as amended, Federal agencies are prohibited from authorizing, funding, or carrying out activities that are likely to jeopardize the continued existence of a listed species or destroy or adversely modify its critical habitat.

Additionally, the Nebraska Natural Legacy Project identifies species that may be at risk of extinction or extirpation from the state. Tier 1 species are those that are globally or nationally at-risk. Tier II contains species that are at-risk within Nebraska while doing well in other parts of their range.

Under the Nebraska Nongame and Endangered Species Conservation Act, the NGPC can designate a species as state-endangered or state-threatened, thus protecting the species from take, exportation, and/or possession. Any project that requires a state-issued permit, uses state funds, or is conducted by a state agency is required to comply with the act.

3.7.1 Existing Conditions

Lands near Box Butte Reservoir are typically privately owned rangelands. Commonly grown crops in Dawes County are wheat, corn, sugar beets, alfalfa, oats, and grain sorghum.

Lands surrounding the reservoir are primarily developed recreation areas or managed as wildlife habitat. Within the WMA, cottonwood trees dominate the reservoir shoreline, although ash, box elder, hackberry, and willow trees can also be found. Other common species in the WMA include:

- Cocklebur,
- Wild licorice,
- Mustard,
- Milkweed, and

- Smartweed.

The Nebraska Natural Legacy Project identifies Biologically Unique Landscapes (BUL) based on known occurrences of natural communities and at-risk species and sets goals for the protection of at risk species and biodiversity. Box Butte Reservoir lies within the Upper Niobrara River BUL (Schneider et al. 2011). The Upper Niobrara River BUL supports several mixed-grass prairie communities. The river bottoms support alkaline meadows and a variety of wetland types.

Upland grasslands are also common in the project area. Some of the dominate grasses in these areas include prairie sand-reed, needle-and-thread, sand bluestem, little bluestem, western wheatgrass, and blue grama. Native vegetation includes Nebraska sedge, basin wild rye, slender wheatgrass, and prairie cordgrass.

Wet and sub-irrigated meadows occur along the Niobrara River both above and below Box Butte dam. Wetland sedges dominate many of these sites, and smooth brome invasion is also problematic in some of these sites. Downstream of the dam, much of the area is dominated by freshwater emergent wetlands. Vegetation includes cattails, a variety of sedges, and rushes and spikerushes.

Noxious/Invasive Species
Red cedar, Russian olive, houndstongue, and Canada thistle invasions are present in the wooded areas. Smooth brome and Kentucky blue grass invasions are present in grassland areas.

State Special Status Species
Gordon's wild buckwheat, large-spike prairie-clover, and meadow lousewort have been identified by the Nebraska Natural Legacy Project as Tier I at-risk species which may occur in the Upper Niobrara River BUL.

Federally-listed Species
The Ute lady's-tresses is listed as threatened under the ESA. Ute lady's-tresses are found in low, sub-irrigated wet meadows with moderately alkaline soils. They are sometimes found in historic floodplains, stable wetlands, and seepage areas near freshwater lakes and springs. The Upper Niobrara River BUL contains the only known population of Ute lady's-tresses in the state, located in Sioux County, which is outside of the project area.

3.7.2 Environmental Effects

Alternative 0: No Action
Direct, Indirect, and Cumulative Effects
This alternative would have no effect on land use or vegetation.

Alternative 1: Toe Drain Replacement (Preferred Alternative)
Direct, Indirect, and Cumulative Effects
This alternative would have no effect on land use and temporary effects to vegetation.

The areas identified for vegetation removal would be kept to the minimum area necessary to complete project work. Vegetation would be cleared from transportation, staging, borrow, and construction areas below Box Butte Dam. Existing vegetation in these areas is primarily smooth brome (invasive), Canada thistle (invasive), and various wetland sedges. After completion of the project, all disturbed areas would be re-contoured as necessary and revegetated with a Reclamation-approved seed mix. Lands exposed during the construction period when the reservoir elevation is temporarily lowered would present an ideal growing environment for noxious weeds. It is expected that newly infested areas would be inundated as soon as the reservoir restriction is lifted.

In order to limit the potential for introduction or future spread of noxious or invasive species, all vehicles and equipment would be properly inspected and cleaned, in accordance with Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species* (DiVittorio 2012).

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
This alternative would increase the land available for recreation and wildlife habitat management by approximately 620 acres.

When reservoir levels recede, standing and fallen timber and stumps can interfere with management and control of noxious weeds and become a safety hazard to boaters. Additionally, the previously flooded soils along the shoreline would present an ideal growing environment for noxious weeds such as Canada thistle and houndstongue. In order to minimize the potential for spread of noxious weeds into the newly exposed areas, Reclamation would undertake extensive reseeding efforts of the exposed areas with an approved seed mix and all ensure that all project vehicles entering bare areas are properly inspected and cleaned, in accordance with Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species* (DiVittorio 2012). Any timber or stumps presenting a safety risk would be flagged or marked to alert boaters of the potential hazard.

3.8 Wildlife

As described in Chapter 3.7, the ESA requires that Federal agencies use their legal authorities to carry out conservation programs for listed species and requires agencies to ensure that their actions do not jeopardize the survival of any endangered or threatened species and/or adversely modify any designated critical habitat upon which such species depend. Additionally, Nebraska identifies at-risk species (Tier I or Tier II) and state-listed threatened or endangered species.

The Bald and Golden Eagle Protection Act (BGEPA) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb and "disturb" means "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest

site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment. A violation of the BGEPA can result in criminal penalties, including fines and imprisonment.

The Migratory Bird Treaty Act (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nest, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. A migratory bird is any species or family of birds native to the U.S. that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. A full listing of species protected under the MBTA can be found at http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/mbtandx.html. Some species and their nests have additional protections under other federal laws, including those listed under the ESA.

3.8.1 Existing Conditions

Box Butte Dam and Reservoir is located with the Upper Niobrara River BUL, which aims to protect at-risk plant and animal species and conserve biodiversity in the BUL.

Habitat surround Box Butte Reservoir supports a variety of wildlife species. Big game species include white-tailed deer, mule deer, antelope (pronghorn) and wild turkey. Small game species include mourning dove, sharp-tail grouse, prairie chicken, ring-necked pheasant, cottontail rabbits, and fox squirrels. A number of furbearer species common to the area include the coyote, badger, skunk, opossum, mink, raccoon, beaver, and muskrats.

Amphibians and reptiles common in the area include the northern leopard frog, western striped chorus frog, bullsnake, eastern yellow-bellied racer, western plains garter snake, prairie rattler, ornate box turtle, and western painted turtle.

Box Butte Reservoir is located within the central flyway for waterfowl and shorebirds and provides important habitat during the fall and spring migrations. Common waterfowl include mallard, gadwall, northern pintail, American widgeon, blue-winged teal, redhead, ring-necked ducks, northern shoveler, lesser scaup, common goldeneye, and bufflehead. Other species of waterbirds and shorebirds commonly observed include Canada goose, American coot, double-crested cormorant, western grebe, eared grebe, great blue heron, ring-billed gull and killdeer. Marsh habitat along the Niobrara River on the upper end of the reservoir provides habitat for rails, common snipe, and other marsh birds. Because of irrigation drawdown and significant amounts of boating and other recreational activity on the reservoir, breeding and nesting opportunities for waterfowl, shorebirds and other waterbirds are limited (NGPC 2008).

Bald eagles are occasionally observed as they follow the large flocks of migrating ducks and geese. Red-tailed hawks, northern harrier, American kestrels, and great-horned owls are seen often, along with an occasional osprey sighting.

Many other species of grassland nesting birds like the western meadowlark, horned lark and grasshopper sparrow are also found in the grassland areas of the WMA; woodpeckers, yellow-

breasted chat, flycatchers, and warblers are common in shrub and cottonwood forest communities.

State Special Status Species
At-risk or state-listed threatened/endangered species that may be seen on or near Box Butte Reservoir include burrowing owl, ferruginous hawk, and long-billed curlew. Potentially suitable habitat is available for the swift fox, although there are no known swift fox populations in or near the project area. River otter, an at-risk species, has been confirmed along the Niobrara River downstream in Sheridan and Cherry Counties, there have been no confirmed otter sightings in or near the project site.

Federally-listed Species
Three species have been identified as having potential to occur within the project area (USFWS 2016).

Whooping crane, an endangered species, migrates through Nebraska between March 23rd-May10th and September 16th-November 16th. Sightings have been recorded in Dawes and Box Butte Counties in the northern panhandle of Nebraska but there are no confirmed sightings on or near the project area. There is no designated whooping crane critical habitat within the project area.

Black-footed ferret, an endangered species, could potentially occur in Dawes County, but based upon the highly disturbed nature of the project, the lack of specific habitat requirements (prairie dog complexes), and the absence of historical sightings, it is unlikely the species is present in the project area.

Northern long-eared bat, listed as threatened under the ESA, could potentially occur in Dawes County. These bats typically roost in cracks and crevices in both alive and dead trees. Males and non-reproductive females have also been known to roost in caves and mines. Based upon the large human presence in the project area, the lack of roosting habitat, and a lack of historical sightings, it is unlikely the species is present in the project area.

3.8.2 Environmental Effects

Alternative 0: No Action
Direct, Indirect, and Cumulative Effects
This alternative would have no impacts to wildlife, including no effect on federally-listed species or their critical habitat.

Alternative 1: Toe Drain Replacement (Preferred Alternative)
Direct, Indirect, and Cumulative Effects
Increased human activity and construction noise would likely trigger avoidance behaviors in wildlife. Species displaced from the construction zone would likely find suitable habitat in the adjacent WMA. After construction, Reclamation's reseeding efforts would return the habitat value of the project area to the same or better condition as pre-construction. Box Butte Reservoir would continue to provide habitat for shorebirds and waterfowl.

There would be no effect to the whooping crane, black-footed ferret, or northern long-eared bat, as these species are not known to inhabit the project area.

To avoid unintentional take of migratory birds and to comply with the MBTA, activities that remove or disturb grasslands, shrubs, and/or trees during May 1st to July 15th are restricted, unless these habitats have been previously removed outside of this timeframe. All project areas not previously cleared between May 1st and July 15th must have a qualified biologist perform pre-disturbance surveys to determine the presence of migratory bird species within the area that would be disturbed. If an active nest is identified, all ground disturbing activities in the vicinity of the nest must be halted until the nest is no longer active or the U.S. Fish and Wildlife Service (USFWS) has been notified and appropriate avoidance measures, disturbance distance, or buffer zone recommendations have been received and implemented. Late summer, fall, winter, and early spring mowing is strongly recommended in order to deter spring nesting.

Additionally, standard raptor protection guidelines would be implemented during construction of project related powerlines, such as those described in "Reducing Avian Collisions with Power Lines: The State of the Art in 2012," a document prepared jointly by the Avian Power Line Interaction Committee and Edison Electric Institute (APLIC 2012). If an eagle is present within the 0.5 mile radius, work must be suspended until the bird leaves of its own volition or if Reclamation, in consultation with the USFWS, determines that the potential for harassment is minimal.

For the reasons described above, this alternative is not expected to have minor impacts to wildlife.

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
This alternative would have a slight effect on wildlife although, even with lower reservoir elevations, Box Butte Reservoir would still provide ample habitat for shorebirds and waterfowl. There would be no effect to listed species.

3.9 Fisheries

As described in Chapter 3.7, the ESA requires that Federal agencies use their legal authorities to carry out conservation programs for listed species and requires agencies to ensure that their actions do not jeopardize the survival of any endangered or threatened species and/or adversely modify any designated critical habitat upon which such species depend. Additionally, Nebraska identifies at-risk species (Tier I or Tier II) and state-listed threatened or endangered species.

3.9.1 Existing Conditions

In 1990, the MFID, the NGPC, and Reclamation entered into an agreement to establish a minimum pool elevation at Box Butte Reservoir of 3,978.0 ft. to support and maintain a viable fishery resource in Box Butte Reservoir. This agreement was modified in 2000 to add an additional 1 ft. to the minimum pool, bringing the minimum pool elevation to 3,979.0 ft. This agreement is in effect through 2020. There is no agreement for a minimum reservoir release to the Niobrara River for fish and wildlife purposes.

Box Butte Reservoir is considered one of the highest quality fishing reservoirs in the state. The reservoir supports populations of northern pike, walleye, yellow perch, channel catfish, rock bass, bluegill, black crappie, gizzard shad, smallmouth bass, and largemouth bass (NGPC 2008).

State Special Status Species
Box Butte Reservoir and the Niobrara River below the dam are within the range of and appear to have suitable habitat for the northern redbelly dace, blacknose shiner, and the finescale dace. All three species are small minors which thrive in cool, quiet, streams and lakes.

Federally-listed Species
There are no federally-listed fish species or critical habitat within the project area.

3.9.2 Environmental Effects

Alternative 0: No Action
Direct, Indirect, and Cumulative Effects
This alternative would have no effect on fisheries.

Alternative 1: Toe Drain Replacement (Preferred Alternative)
Direct, Indirect, and Cumulative Effects
Short-term impacts to fisheries are anticipated under this alternative.

Fisheries impacts as a result of temporary drawdowns in reservoir elevation, needed to control seepage during construction, would include a temporary decrease in food and habitat availability, as well as concentration of fish into a smaller area, and potential increases in predation and fish loss through the outlet works. After construction, the temporary elevation restriction would be lifted and fisheries would return to preexisting levels.

One of the temporary access routes would require crossing the Niobrara River downstream of the dam. Through consultation with the NGPC, the proposed stream crossing has been designed to be fish-friendly, with a no-slope culvert and countersunk to allow natural substrate to settle to the bottom of the culvert, all of which would avoid the creation of an elevation barrier to fish movement.

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
Although this alternative would meet the conditions outlined in the 1990 agreement, this alternative would have a long-term impact on fisheries. The lower reservoir elevation would concentrate fish populations, thereby increase competition for food and habitat and increasing predation.

3.10 Recreation

3.10.1 Existing Conditions

Box Butte Reservoir is a popular destination for aquatic and outdoor sports, including picnicking, bird watching, ice fishing, open water fishing, hunting (big game, small game, and waterfowl). The majority of Box Butte Reservoir visitors come from a 100-mile travel radius.

At full pool, the reservoir elevation is 4,000 feet, with 1,537 surface acres, 14 miles of shoreline, and 433 acres of WMA. Additionally, the Niobrara River above and below the reservoir also attracts waterfowl hunters. Recreation opportunities and facilities at Box Butte Reservoir are managed by NGPC. NGPC manages 14 RV campsites with power supply and 40 primitive campsites, along with multiple vault toilets, picnic shelters and tables, and grills. The reservoir also offers a small beach and an open swim area, along with two boat ramps.

Three improved roads (graveled) provide access to the northern and western portions of the WMA. Walk-in access to the southern portion of the WMA is available from the southern end of the dam road. Access to the WMA below the dam is available from northern and southern ends of the dam road and a paved county road. There are several unimproved parking areas and two graveled parking areas on the WMA.

3.10.2 Environmental Effects

Alternative 0: No Action
Direct, Indirect, and Cumulative Effects
This alternative would have no impact on recreation.

Alternative 1: Toe Drain Replacement (Preferred Alternative)
Direct, Indirect, and Cumulative Effects
The anticipated construction schedule indicates that one recreation season may be affected by project activities, although impacts are expected to be minimal.

Overall noise levels are expected to increase for the duration of the project, which may negatively impact the enjoyment of quiet spaces. High intensity noise (such as drilling or jackhammering) would be prohibited between the hours of 7:00 pm to 7:00 am.

Temporary/intermittent closures of the main entrance road (Box Butte State Recreation Area Road) may occur during intensive construction periods. Reclamation would provide public notification of road closures in advance of such closures. Additionally, temporary reservoir drawdowns may render some boat ramps unusable, but fishing and boating access would still be available by launching boats from the shoreline. The campground located just north of the spillway would remain open for the duration of the project, although access to the site would be available from the northern access (River Road) point only. The WMA at the south end of the dam would not be accessible by vehicle but would remain accessible via boat. Day use areas, picnic shelters, and campsites would remain open to the public during construction.

Alternative 2: Reservoir Restriction (3,995 feet)
Direct, Indirect, and Cumulative Effects
While lower reservoir elevations would not eliminate recreational opportunities at Box Butte Reservoir, some recreational facilities, such as boat ramps and docks, may lose functionality. Picnic shelters, campsites, and vault toilets may need to be relocated in order to better serve the

public. Surface area available to water-based recreation would be reduced, although surface area available for land-based recreation would increase.

3.11 Economic and Social Factors

Environmental justice refers to the protection of human rights, particularly to minority and low income populations. E.O. 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires that each Federal Agency identify and address, as appropriate, disproportionately high and adverse human health and environmental effect of its programs, policies, and activities on minority populations and low-income populations.

In accordance with the Act, the Federal government is responsible for 85% of the cost associated with undertaking SOD corrective actions at Box Butte Dam, with project water users responsible for repaying the remaining 15%.

3.11.1 Existing Conditions

In 2014, Dawes County had a population of 9,042 individuals (U.S. Census Bureau 2014a and 2014b). In the next 10 years, the population is expected to grow by 0.1%, or 9 individuals.

Within a half mile of the project area, there are zero households; within one mile of the project area, the population is four individuals; within two miles of the project location, the population is size individuals. The nearest population centers are Chadron, NE and Alliance, NE. The median household income in Dawes County is $41,267, which is lower than the nationwide average of $53,482. The number of persons in poverty in Dawes County is 16.9%, which is above the national average of 14.8%.

In 2014, the vast majority of the population within Dawes County identified their race as "white" (91.8% or 8,425 individuals), followed by "American Indian and Alaska Native" (5.3% or 488 individuals), then "Black or African American," (2% or 180 participants) (U.S. Census Bureau 2014a and 2014b).

3.11.2 Environmental Effects

Alternative 0: No Action

Direct, Indirect, and Cumulative Effects

The No Action alternative would not result in an economic loss of benefits or any other socioeconomic impacts. If Box Butte Dam were to eventually fail, approximately 105 people would be at risk, with potential loss of live anywhere between zero to two persons, but would not present a disproportionate effect on low income or minority populations.

Alternative 1: Toe Drain Replacement (Preferred Alternative)

Direct, Indirect, and Cumulative Effects

This alternative would result in no impacts to the overall socioeconomics of the region, nor would it result in disproportionate impacts to minority or low income populations. Recreation, fish and wildlife, and irrigation water supply would likely see a temporary decline in conditions, but there is no estimated economic loss in benefits and conditions would fully rebound after construction is completed.

The total cost of this project ranges between $8.1 and $21.3 million, depending upon any "plus" alternatives incorporated. During development of the reimbursable and non-reimbursable costs, a mid-level estimate of $12.9 million was assumed, making the government portion of the project $10.965 million and the reimbursable portion due from water users $1.935 million. The MFID would be responsible for making annual payments of $38,700 ($3.33 per acre for each of the 11,662 acres within the MFID) for a term of 50 years. Based upon the repayment term and the actual total project costs, annual payments could vary from the values presented above.

Alternative 2: Reservoir Restriction (3,995 feet)

Direct, Indirect, and Cumulative Effects

The total cost of this project is estimated to be approximately $7 million dollars, making the reimbursable portion of the project about $157,500. Although this alternative imposes a low repayment obligation on the MFID, the alternative would also result in a loss of $3.6 million in benefits provided by the Box Butte Dam and Reservoir. Lost benefits encompass reduced recreation opportunities, reduced tourism and visitation, reduced irrigation water supply, etc.

Chapter 4: Environmental Commitments

The mitigation measures and best management practices listed in Table 5 were developed to minimize or avoid adverse impacts to people or natural resources as a result of the alternatives presented in this EA:

Table 5: Environmental Commitments

Description of Mitigation Measure/Best Management Practice	Alternative
Climate Conditions	
Only equipment and vehicles which meeting state and federal emissions guidelines would be utilized during project activities. If equipment or vehicles show signs of excessive emissions, they shall not be operated until corrective repairs or adjustments are taken to reduce emissions to within guidelines.	1
All equipment and vehicles shall be powered off when not in use.	1
Soils	
Where activities result in exposing bare soil, those sites would be evaluated to determine the need for revegetation (seeding, planting), mulching, or other erosion or sediment control measures. The evaluation would consider the potential for invasion by weed species, potential for erosion, water runoff, and/or stream sedimentation.	1, 2
When possible, locate staging and stockpiling areas, borrow areas, and haul roads in areas with gentle slopes, where erosion potential is slight.	1
Develop and implement a SWPPP	1, 2
Divert storm water runoff originating on upslope areas away from disturbed areas.	1
Restore and revegetate all disturbed areas. Restoration measures include contouring and grading, planting erosion control grass species for temporary revegetation, and permanent revegetation efforts utilizing a Reclamation-	1, 2

approved seed mix.	
Confine all vehicle traffic to designated access routes and staging areas	1
Limit bare soil to the minimum area required to complete project activities	1
Cultural Resources, Indian Trust Assets, and Paleontological Resources	
If unknown cultural or paleontological resources were discovered during project activities, all activity would be halted until Reclamation's Nebraska-Kansas Area Office archeologist is notified and appropriate consultations are completed.	1, 2
Water Resources	
Obtain and comply with all appropriate permits, including Section 404 and NPDES permits, in order to identify appropriate mitigation measures to compensate for the loss of wetlands as a result of project activity.	1, 2
Develop and implement a SWPPP	1, 2
Store hazardous materials at least 100 feet away from receiving waters.	1
Vehicle refueling and maintenance shall be performed at least 100 feet from receiving waters.	1
Air Quality	
All equipment would be powered off when not in use.	1
All material excavated, stockpiled, or graded would be sufficiently watered, treated, or covered to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard.	1
All equipment would be maintained in accordance with the industry emissions standards. Equipment and vehicles that show excessive exhaust gas emissions would not be operated until corrective repairs or adjustments are taken to reduce such emissions to acceptable levels.	1
All areas with vehicle traffic would be watered or have dust palliative applied as necessary to control dust emissions.	1
All land clearing, grading, earth moving, or excavation activities on a project would be suspended as necessary to prevent excessive windblown dust when winds are expected to exceed 20 miles per hour.	1
All on-site vehicle traffic would be limited to a speed of 15 miles per hour on unpaved roads.	1
Ensure compliance with Nebraska Fugitive Dust Regulations (Title 129 - Nebraska Air Quality Regulations, Chapter 32 - Dust; Duty to Prevent Escape.)	1
Land Use and Vegetation	
Proper inspection and cleaning of equipment would be a long-term tactic to prevent invasive species and pests from spreading into new places. Refer to Reclamation's *Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species* (Divittorio 2012)	1, 2
Restore and revegetate all disturbed areas. Restoration measures include contouring and grading, planting erosion control grass species for temporary revegetation, and permanent revegetation efforts utilizing a Reclamation-approved seed mix.	1, 2
Wildlife	
Restore and revegetate all disturbed areas. Restoration measures include	1, 2

contouring and grading, planting erosion control grass species for temporary revegetation, and permanent revegetation efforts utilizing a Reclamation-approved seed mix.	
Standard raptor protection guidelines would be implemented during construction of project related powerlines, such as those described in "Reducing Avian Collisions with Power Lines: The State of the Art in 2012," a document prepared jointly by the Avian Power Line Interaction Committee and Edison Electric Institute (APLIC 2012).	1
If an eagle is present within the 0.5 mile radius, work must be suspended until the bird leaves of its own volition or if Reclamation, in consultation with the USFWS, determines that the potential for harassment is minimal.	1
To avoid unintentional take of migratory birds and to comply with the MBTA, activities that remove or disturb grasslands, shrubs, and/or trees during May 1st to July 15th are restricted, unless these habitats have been previously removed outside of this timeframe. All project areas not previously cleared between May 1st and July 15th must have a qualified biologist perform pre-disturbance surveys to determine the presence of migratory bird species within the area that would be disturbed. If an active nest is identified, all ground disturbing activities in the vicinity of the nest must be halted until the nest is no longer active or the USFWS has been notified and appropriate avoidance measures, disturbance distance, or buffer zone recommendations have been received and implemented. Late summer, fall, winter, and early spring mowing is strongly recommended in order to deter spring nesting.	1
Fisheries	
Stream crossing shall be designed to be fish-friendly, with a no-slope culvert and countersunk to allow natural substrate to settle to the bottom of the culvert, all of which would avoid the creation of an elevation barrier to fish movement.	1
Recreation	
High intensity noise (such as drilling or jackhammering) would be prohibited between the hours of 7:00 pm to 7:00 am.	1
Provide public notification of road closures in advance of such closures.	1

Chapter 5: Consultation and Coordination

Public involvement and agency coordination are required as part of the NEPA process (40 CFR 1501.4(b) and 1506.6(b)).

For this project, public involvement activities included:

- Scoping meeting on July 28th, 2015 in Alliance, Nebraska.
- Website development to inform the public about the proposed project and environmental documents, provide updates about public involvement opportunities, and provide an online comment forum.
- Press releases.
- Legal announcements in local news outlets.

Reclamation invited public review and comment on the Draft EA between January 15th and February 12th, 2016. Reclamation received a total of 63 comments on the Draft EA. In general, public comments fell into the following main categories: socioeconomic impacts, recreation impacts, lost fish and wildlife benefits, increased erosion, and expressing support for one or more project alternatives.

In response to public comments, Reclamation provided clarifications and expanded discussion in sections 3.3.2 (Soils), 3.5.2 (Water Resources), 3.7.2 (Land Use and Vegetation), 3.9.2 (Fisheries), 3.10.2 (Recreation), and 3.11.2 (Economic and Social Factors). Also, Reclamation identified Alternative 1 (Toe Drain Replacement) as the Preferred Alternative and provided additional details on required construction dewatering and reservoir drawdowns.

In addition to public involvement, the following entities were consulted during the preparation of this EA:

- NGPC
- Nebraska SHPO
- NPS
- USFWS
- MFID
- NDEQ

Copies of public involvement materials, including distribution lists, mailings, and public comments and responses, can be found in the project record.

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