RECLAMATION

Managing Water in the West

Draft Environmental Assessment

TSAILE DAM

Safety of Dams Rehabilitation Project
Apache County, Arizona

U.S. Department of the Interior
Bureau of Reclamation
Phoenix Area Office

August 2011

Mission Statement

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities. Included in that mission is the responsibility of the Bureau of Indian Affairs to protect, to the extent practical, people who reside in or who otherwise occupy the floodplain downstream from Bureau of Indian Affairs dams.

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1.1 INTRODUCTION

The Bureau of Reclamation (Reclamation) has prepared this Environmental Assessment (EA) to analyze potential effects to physical, biological, and cultural resources that may result from Safety of Dams (SOD) repairs to Tsaile Dam on the Navajo Indian Reservation in Apache County, Arizona. The EA was prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality Regulations (40 CFR 1500-1508), and Department of the Interior (DOI) NEPA regulations (43 CFR 46). Reclamation is the lead Federal agency pursuant to NEPA. The Bureau of Indian Affairs (BIA), Navajo Nation Department of Water Resources (NNDWR), National Park Service (NPS), and U.S. Fish and Wildlife Service (FWS) are cooperating agencies for the preparation of this document.

This document is organized into eight chapters and appendices:

- ***Chapter 1 – Purpose and Need.*** Chapter 1 presents information on the history of the project proposal, the purpose of and need for the project, and the lead agency's proposal for achieving that purpose and need. This chapter also describes public involvement in the NEPA process and lists environmental issues that were raised during internal and external scoping.
- ***Chapter 2 – Comparison of Alternatives, including the Proposed Action.*** Chapter 2 provides a detailed description of the lead agency's proposed action to meet the stated purpose and need.
- ***Chapter 3 – Affected Environment and Environmental Consequences.*** Chapter 3 describes the environmental effects of implementing the proposed action and no action. Within each section, the affected environment is described first, followed by a discussion of the potential effects of no action and the proposed action.
- ***Chapter 4 – Mitigation Measures***. Chapter 4 identifies measures taken to reduce or compensate for impacts of the project.
- ***Chapter 5 – Consultation and Coordination.*** Chapter 5 identifies persons who contributed to the preparation of this EA and lists agencies and persons consulted during the NEPA process.
- ***Chapter 6 – List of Preparers.*** Individuals who prepared or contributed to preparation of the EA.
- ***Chapter 7 Environmental Laws and Directives.*** Chapter 7 lists Federal environmental laws and directives that are relevant to the project.
- ***Chapter 8 – Literature Cited:*** Chapter 8 lists documents used in preparation of this EA.
- ***Appendices –*** The appendices provide more detailed information to support the analysis presented in this EA.

1.2 BACKGROUND

The NNDWR and BIA, in cooperation with Reclamation, propose to rehabilitate Tsaile Dam to correct verified SOD deficiencies that potentially threaten public safety. Tsaile Dam is situated inside the northeastern boundary of Canyon de Chelly National Monument along the western edge of the Chuska Mountains. Construction of the dam was completed in 1964 by the Navajo Nation to provide opportunities for recreation and irrigation. In 1982 and 1983, the dam and spillway were modified to address seepage concerns related to the development of sinkholes on the downstream face of the embankment and inability of the spillway to pass the probable maximum flood.

Tsaile Dam has an "L" shaped embankment with a crest length of 1,950 feet and crest elevation of 7,037.3 feet. Similar in many respects to other major dams on the Navajo Nation, Tsaile Dam consists of a riprap-armored earthen embankment, gated outlet works, and uncontrolled spillway. The outlet works consist of a 24-inch-diameter, asphalt-coated, corrugated metal pipe (CMP) with a concrete intake box located near the bottom of the reservoir at elevation 6,988.6 feet. A 24-inch-diameter slide gate is located in the intake structure and is operated by a hydraulic hand pump placed inside a concrete vault on the upstream face of the dam. Maximum computed discharge capacity of the outlet works is 41 cubic feet per second (cfs) when the reservoir is at the spillway crest elevation of 7,029.4 feet.

The spillway is an uncontrolled 200-foot-long concrete ogee weir structure located adjacent to the right (north) abutment of the dam. A bedrock-bottomed approach channel connects the main body of the lake to the spillway. Discharges from the spillway re-enter Tsaile Creek a short distance downstream of the dam.

Tsaile Dam is operated by the NNDWR SOD Program. Because of safety concerns, the reservoir is currently restricted to a maximum operating elevation of 7,023 feet, or 6 feet below the normal reservoir water level. Due to the deteriorated condition of the CMP, the use of outlet works was suspended and its function replaced by two siphons that were installed in 1999 and 2000. These siphons regulate lake levels, maintain the existing drawdown, and provide reservoir evacuation capability. Depending on the reservoir water level, releases from the siphons can range anywhere from 0 to 20 cfs. During periods of high stream inflow, pumps are sometimes used to increase the evacuation capability.

Two buried toe drains installed as a part of the 1983 modifications discharge foundation seepage to Tsaile Creek downstream of the dam. The toe drain pipes run along the rock ledges that constitute the right and left abutments before daylighting in the creek. A third pipe discharges seepage from the CMP into the creek downstream of the toe drains.

Under normal (pre-2000) operating conditions, runoff from snowmelt and rainfall was allowed to fill the reservoir to the spillway crest elevation. At that elevation, the reservoir stores 5,500 acre-feet of water.

1.3 PURPOSE AND NEED FOR ACTION

The primary purpose of the proposed project is to correct verified SOD deficiencies that could jeopardize the structural integrity of Tsaile Dam. Corrective action is needed to reduce the probability of embankment failure and associated risk to the public from continued impoundment of water behind Tsaile Dam. The project will also restore full functionality of the dam.

Catastrophic failure of Tsaile Dam, with the water level at the embankment crest, would threaten Navajo residents and tourists throughout the entire length of Canyon del Muerto within Canyon de Chelly National Monument. Flooding would also affect low-lying areas near Chinle. The NPS estimates there are approximately 50 Navajo families that reside in the monument's canyons on a seasonal basis. In addition, as many as 3,400 tourists may enter the canyons in some months. Rapid evacuation of canyon residents and tourists during a catastrophic failure of Tsaile Dam would be problematic.

The following verified SOD deficiencies are described in greater detail in an issue evaluation study (IE) prepared by Reclamation (2010). The IE identified dam safety deficiencies with respect to normal operations, seismic events, and flood conditions.

- *Potential for internal erosion associated with the damaged CMP outlet works.* Inspection of the outlet works conduit concluded that joints were separated, a section of the crown was ruptured, and leaks were present. In addition, transverse cracks caused by collapse of the conduit were detected in adjacent embankment materials. Internal erosion of embankment soils caused by piping of material into, and along the exterior of, the CMP is a potential failure mode. Operation of the CMP could initiate internal erosion of the embankment by water flowing out of the rupture and separated joints.

- *Liquefaction of foundation soils.* It was determined in the IE that the embankment could liquefy during a seismic event resulting in collapse of the upstream and/or downstream portion of the embankment and subsequent loss of freeboard.

- *Flood effects*. Higher surface water levels resulting from flood flows into the reservoir could increase internal erosion of the embankment and result in failure of the dam.

- *Inadequate access to the dam during spillway discharges.* The main access route to the dam passes through the spillway. This route cannot be used when the spillway is active. Other access routes exist but are on unimproved dirt roads that are often impassible during storm events.

1.4 PROJECT LOCATION

Tsaile Dam is located in the Tsaile/Wheatfields Chapter of the Navajo Nation, approximately 21.5 miles northeast of Chinle, Arizona (Figure 1). The project area includes the dam, spillway, a contractor use area north of the spillway, and borrow areas along the south side of the reservoir (Figures 2 and 3).

1.5 PUBLIC INVOLVEMENT

The Council on Environmental Quality (CEQ) defines scoping as "… an early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a proposed action (40 CFR 1501.7)." Scoping is an important underpinning of the NEPA process that encourages public input and helps focus the environmental impact analysis on relevant issues. Distribution of scoping information typically heralds the beginning of the public component of the NEPA process.

A scoping notice soliciting public comment on the proposed project was distributed to potentially interested individuals, organizations, and agencies on March 25, 2011. Reclamation also posted the scoping notice on its Phoenix Area Office web site and submitted news releases regarding the proposal to 10 news media outlets including the *Navajo Times* and *Arizona Republic*. Two people submitted written comments and one person provided comments telephonically.

A public meeting was held at the Tsaile/Wheatfields Chapter House on May 17, 2011. The meeting was attended by staff from the BIA, the NNDWR SOD Program, Reclamation, and representatives and residents from the Tsaile/Wheatfields and Chinle chapters. Eighteen people attended the public meeting.

Several issues were identified from discussions among cooperating agency staff and the public during scoping. The following environmental issues were considered in the planning process and contributed to the development of strategies to mitigate the impacts of construction.

- potential effects to biological resources, including resident bald eagles
- potential effects to flow in Tsaile Creek downstream of the dam
- potential effects to cultural resources
- potential effects to downstream water users and canyon residents

1.6 DECISIONS TO BE MADE

Reclamation prepared the engineering designs and is responsible for managing the construction phase of the project. The Navajo Nation, in cooperation with BIA, must decide whether to implement the preferred action, implement an alternative action, or take no action.

The Responsible Official for Reclamation (Area Manager of the Phoenix Area Office) must make a determination regarding the environmental effects of the proposed project. If the EA demonstrates that there are no significant effects, the Area Manager would record this determination in a Finding of No Significant Impact (FONSI) and assume responsibility for construction management. Reclamation's FONSI would be made available at http//:www.usbr.gov/lc/phoenix.

The Responsible Official for BIA (NEPA Coordinator of the Navajo Regional Office) also must make a determination regarding the environmental effects of the proposed project. If the EA demonstrates that there are no significant effects, the NEPA Coordinator would record this determination in a FONSI. BIA's FONSI and decision regarding the expenditure of BIA funds to implement the proposed project also would be available at http//:www.usbr.gov/lc/phoenix.

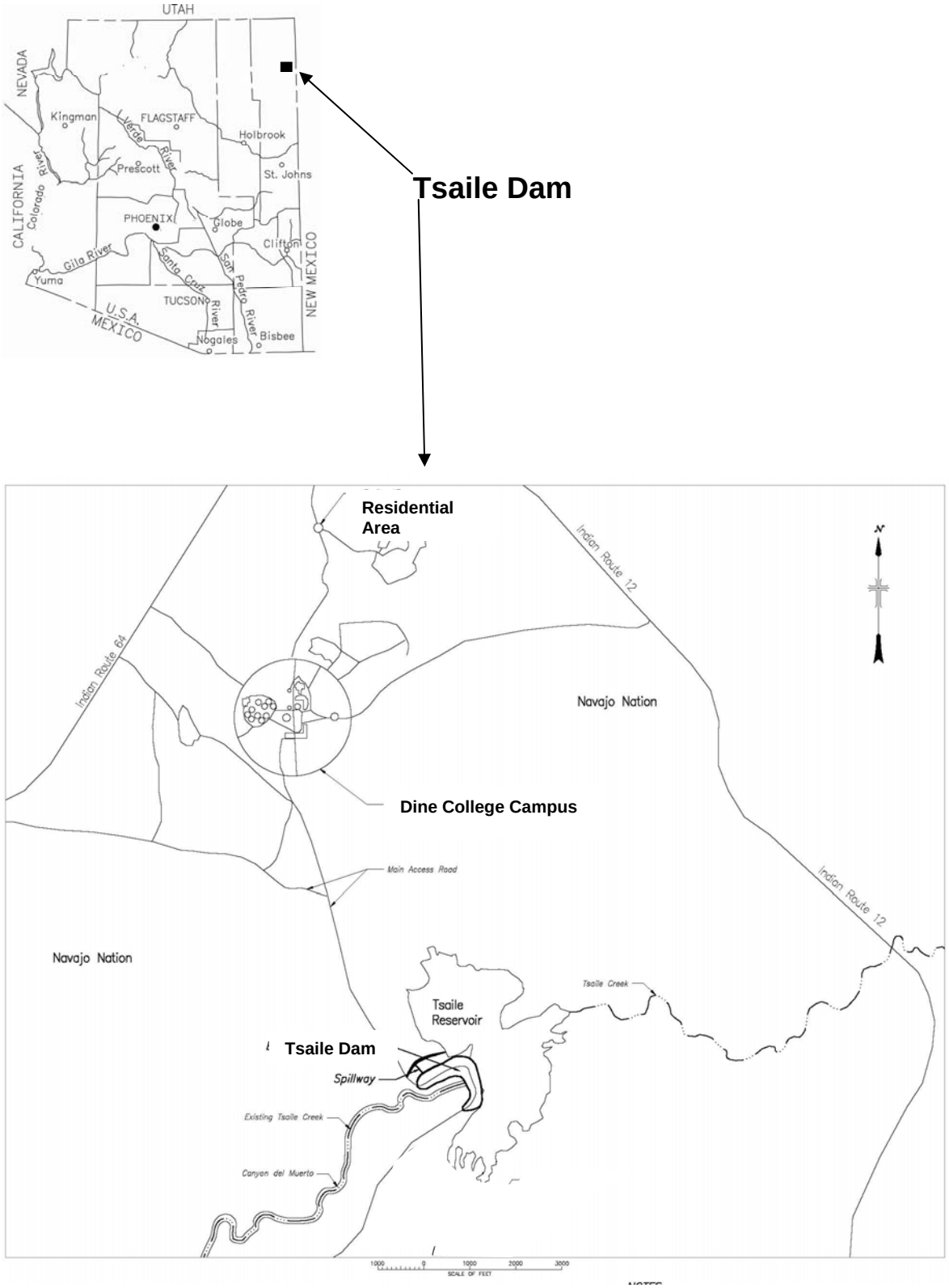

Figure 1. Project location map.

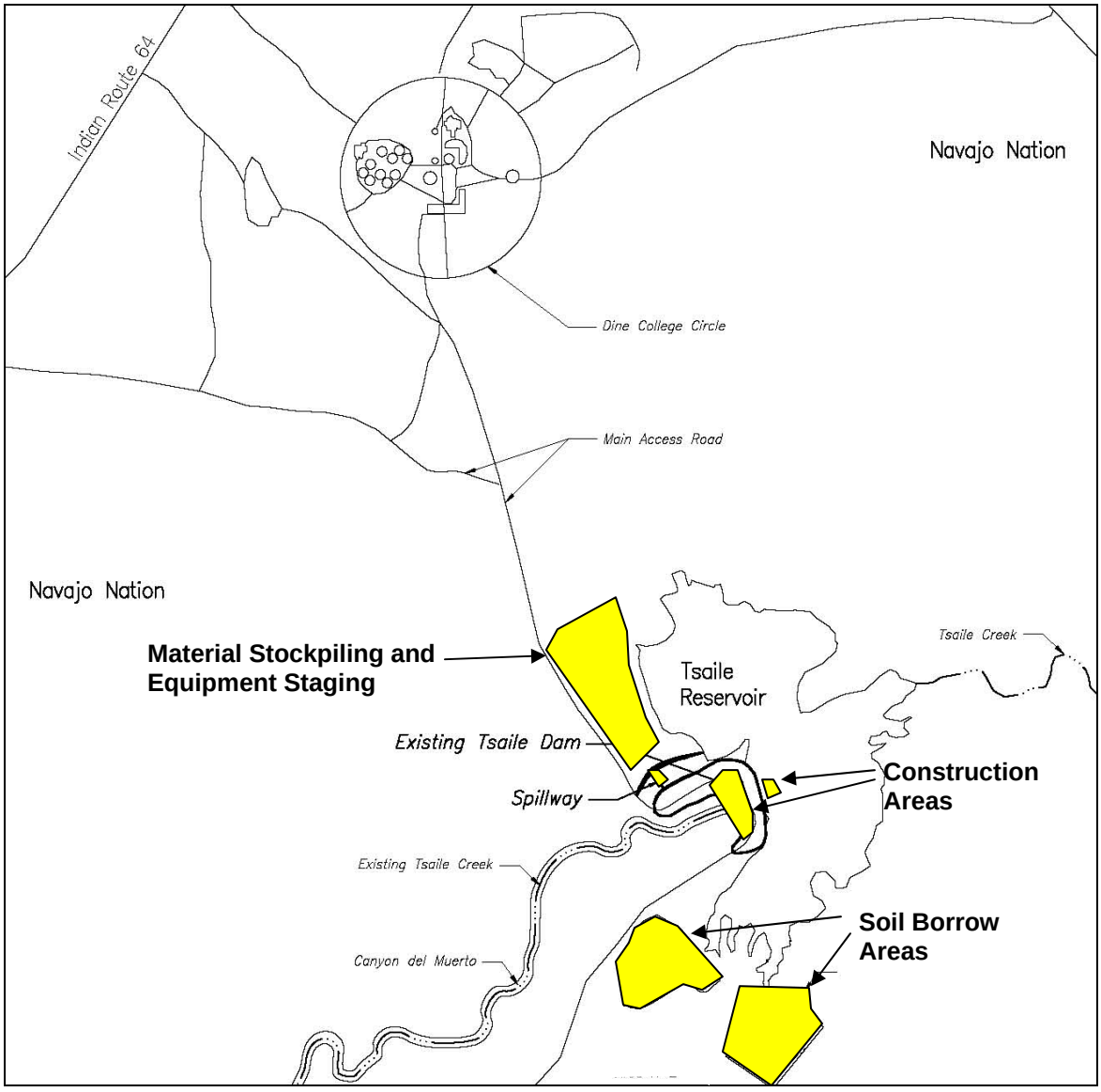

Figure 2. Construction impact areas.

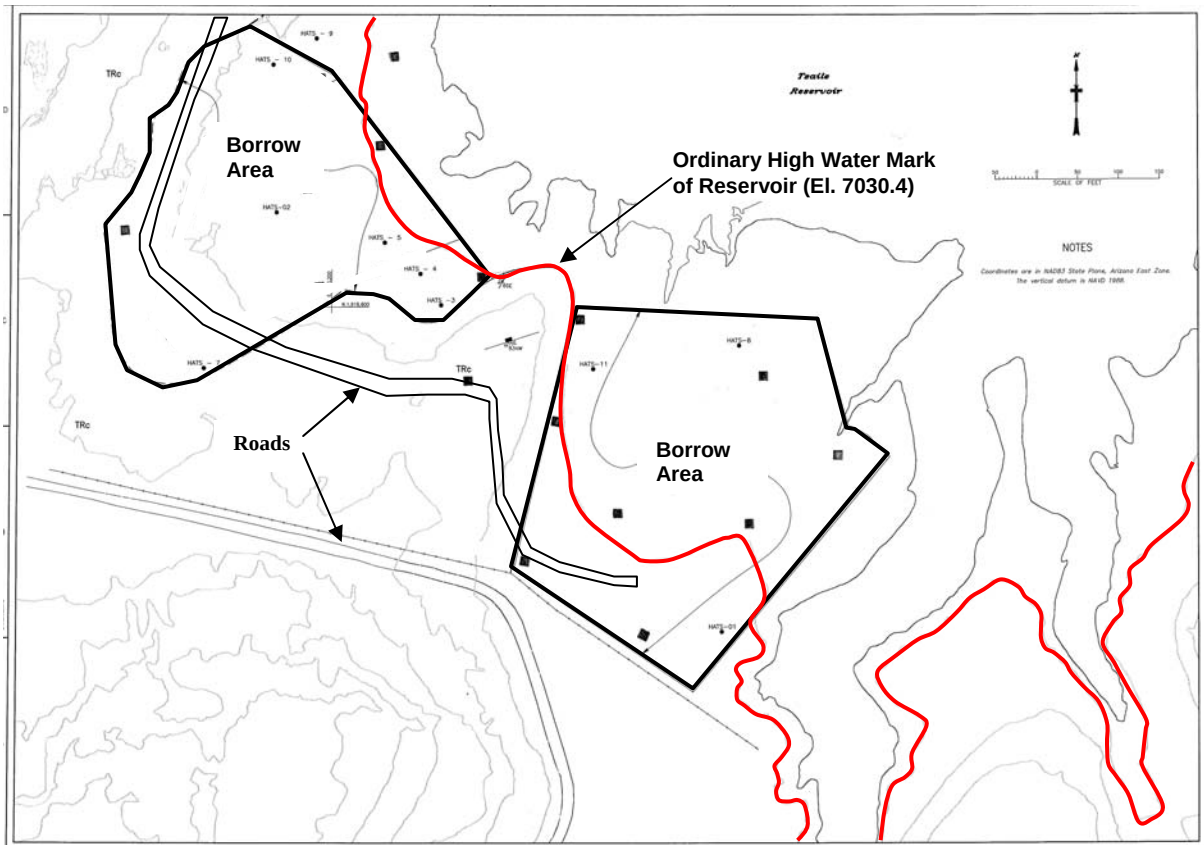

Figure 3. Borrow areas vs. ordinary high water mark.

CHAPTER 2 - DESCRIPTION OF ALTERNATIVES

The EA analyzes two design alternatives that satisfy the purpose and need for corrective action. No action is also considered. The design alternatives are the result of an analytical process which identified safety issues (Reclamation 2005) and formulated conceptual engineering designs (Reclamation 2007) for correcting the verified SOD deficiencies with high risk of embankment failure. Documentation of the design process and corresponding engineering decisions are located in the project file at Reclamation's Technical Service Center, Denver, Colorado. Correction of verified SOD deficiencies would result in implementation of one of the action alternatives described below.

2.1 NO ACTION

Section 102(2)(E) of NEPA requires that no action must be considered as an alternative in an environmental review whenever there are unresolved conflicts about the proposed action with respect to alternative uses of available resources. A description of "no action" is also customarily used in an EA to provide the baseline for comparison of environmental effects of the action alternatives against conditions that are representative of the status quo. As considered in this EA, if no action is taken, neither action alternative described below would be implemented and the status quo condition would persist (Figure 4). Without suitable corrective action, existing safety deficiencies will continue to be a concern for the foreseeable future. More restrictive operating requirements, such as additional drawdown of the reservoir, are possible if internal erosion of the embankment continues.

2.2 ALTERNATIVE A (PREFERRED ACTION) – LINE EXISTING OUTLET WORKS AND CONSTRUCT NEW STABILITY BERM

The NNDWR, in cooperation with Reclamation and BIA, proposes the following action to correct verified safety deficiencies and restore full operation of the outlet works. Implementation of the Preferred Action would require approximately 21 months. Construction would commence in March 2012 and end in December 2013.

Dam Embankment Modification. Under the Preferred Action, the existing downstream berm and 10 feet of foundation material underlying the berm would be excavated and removed. A substantially larger berm would be placed over the excavation, forming a new downstream embankment that is keyed into the foundation for greater stability. This new berm would have a width of 25 feet at the crest of the dam, a 3:1 slope, and a 70-foot-wide horizontal bench at elevation 7,015.7 (Figure 5; Appendix A, Figure A-1). The toe of the stability berm would extend approximately 66 feet further downstream than the existing embankment.

The stability berm would include new sand and gravel filtration and drainage systems. These systems would filter any material transported in seepage flowing through the embankment, the foundation, and around the CMP. Seepage would be collected by two

new toe drains that discharge into Tsaile Creek via the stilling basin. Cleanouts and inspection wells would be included in the toe drain system.

Construction of the stability berm would require approximately 44,500 cubic yards (yd^3) of earthen fill. Approximately 28,000 yd^3 of material would be borrowed onsite; the remaining16,500 yd^3 of material would be recycled from the old berm.

The filtration and drain systems would require 7,500 yd^3 of sand and 230 yd^3 of gravel, all of which would be acquired from a commercial source.

Outlet Works Modification. A major component of this alternative would be a pair of high-density polyethylene (HDPE) liner-pipes sliplined into the existing 24-inch-diameter CMP. Two HDPE liners would be used to provide redundancy in the unlikely case one of the liners ruptures. The outer and inner liners would have diameters of 20 and 16 inches, respectively. The liners would be constructed onsite from sections of pipe that are thermally butt-welded together. Once in place, the annular areas between the old CMP and new liners would be filled with cement grout using low-pressure grouting techniques. Sufficient pressures would be utilized during this grouting process to encourage grout travel through existing small openings and ruptures in the CMP to fill any voids that may exist at the interface between the embankment and CMP. Filling the annular areas between the liners and CMP would eliminate the potential for seepage to enter and travel through these spaces. The 20-inch diameter HDPE liner would be encased in concrete between the CMP and new outlet portal.

The existing intake structure would be removed prior to sliplining. After the HDPE liners are installed, a new concrete intake structure, slide gate, and trash rack would be constructed near the location of the former structure.

Maximum discharge of the rehabilitated outlet works would be approximately 35 cfs when the lake surface is at the spillway crest elevation.

Stilling Basin. A Type-VI concrete stilling basin would be constructed to dissipate the energy in the flow from the outlet works. The stilling basin would have a total length of 12.5 feet. Approximately 20 feet of the outlet channel immediately downstream of the stilling basin would be lined with riprap to reduce the potential for stream-bank erosion.

Pedestrian Bridge. A 9-foot-wide, 266-foot-long prefabricated pedestrian bridge would be installed across the spillway channel. The bridge would be located approximately 150 feet upstream of the concrete ogee (Figure 5). Two concrete abutments and one center pier would be required. Installation of this bridge would allow NNDWR SOD personnel to access the dam when flows are present in the spillway. The bridge would not be open to the public.

Construction Borrow Areas. Two borrow areas encompassing approximately 6.8 acres are proposed along the southern edge of the reservoir (Figures 2 and 3). These areas would provide suitable material for construction of the stability berm.

Construction Staging Area. Equipment staging and material stockpiling would require approximately 2 acres. A 35-acre tract north of the spillway would be made available to the contractor for siting the staging area. The actual location of the 2-acre staging area within this larger tract would depend on logistical requirements identified during the mobilization phase of construction.

Temporary Cofferdam and Dewatering. Repair of the outlet works would require evacuation of water from Tsaile Reservoir. Active pumping would be utilized with the existing siphons and outlet works to gradually dewater the reservoir. Drawdown would begin in September 2011 and continue until construction begins in March 2012. After the reservoir is drained, a 6-foot high earthen cofferdam with a 1,250 acre-foot storage capacity would be installed around the intake structure to ensure that the work area remains dry during construction. Approximately 2,100 yd^3 of fill would be required to construct the cofferdam. The cofferdam would be removed when construction is completed. Dewatering would continue until the end of construction in December 2013.

2.3 ALTERNATIVE B – REPLACE OUTLET WORKS AND CONSTRUCT NEW STABILITY BERM

An outlet works replacement alternative was evaluated by Reclamation, BIA, and NNDWR. Under this alternative, the dam would be excavated along the alignment of the existing outlet works so that the old conduit and intake structure could be removed and new facilities installed. The embankment would be excavated to a depth slightly below the invert of the existing outlet works, creating a 25-foot bottom width and 4:1 side slopes. Excavated material would be hauled to the staging area for temporary storage. New facilities would consist of a control house on the crest of the dam, an 8-foot-long by 8-foot-wide trash rack concrete intake box, a 24-inch hydraulically operated slide gate at the inlet to the conduit, and a 36-inch-diameter steel lined reinforced concrete conduit through the dam. Similar to the Preferred Action, this alternative requires construction of a stability berm with shear key, new sand filter and gravel drain systems, new toe drains, a Type VI concrete impact basin with riprap lining along the outlet channel, and a pedestrian bridge across the spillway channel. The size of the new stability berm and requirements for construction staging/stockpiling and borrow would be similar to those identified in the Preferred Action. Maximum computed discharge of the outlet works would be 193 cfs. A minimum of 5 months would be needed to drain the reservoir prior to construction. Construction would require up to 30 months, commencing in March 2012 and ending in September 2014.

2.4 ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

Several design options were considered and eliminated prior to detailed evaluation because of anticipated higher cost or technical inferiority. These options are described in the conceptual design report for Tsaile Dam (Reclamation 2007).

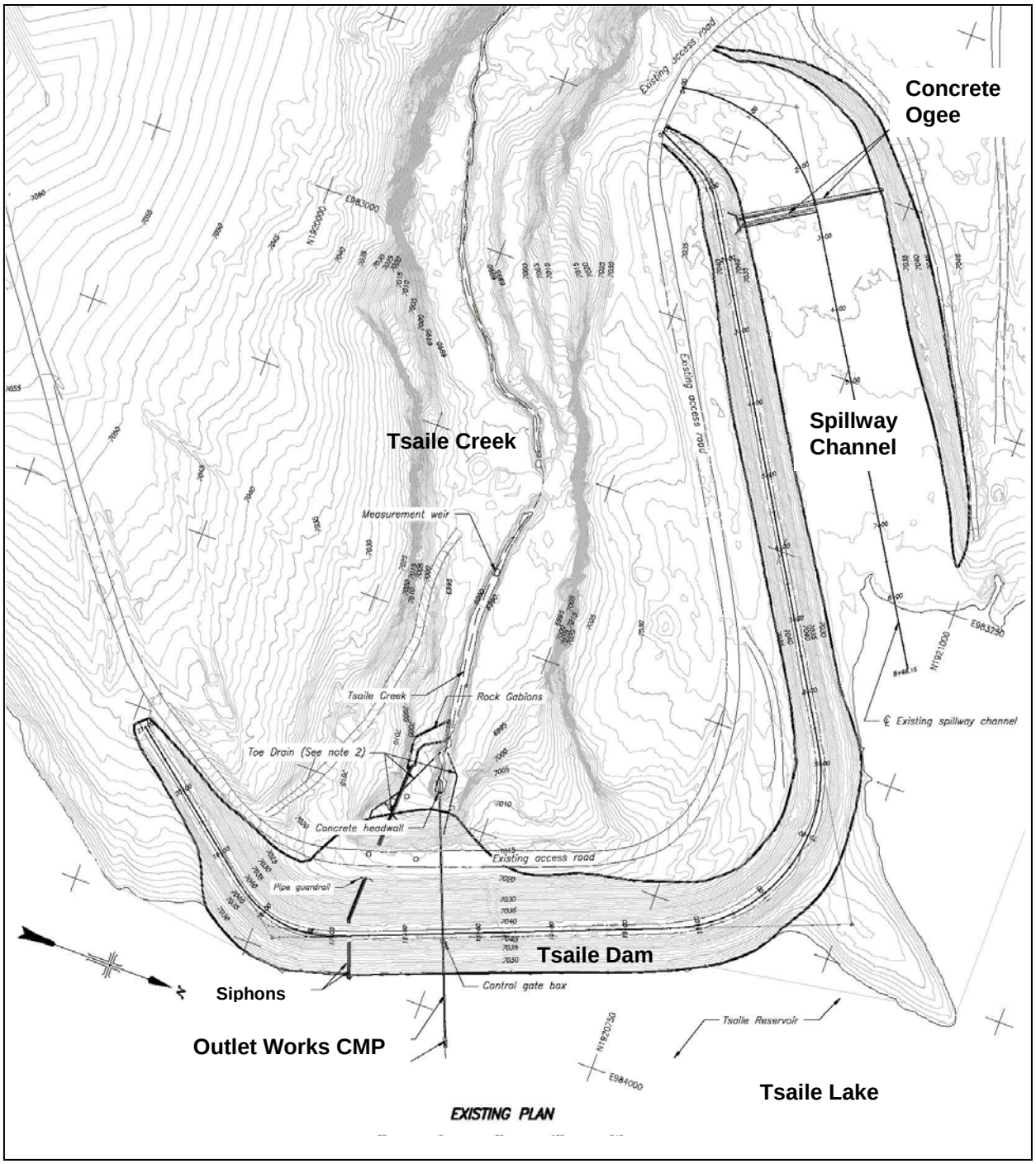

Figure 4. Existing embankment configuration.

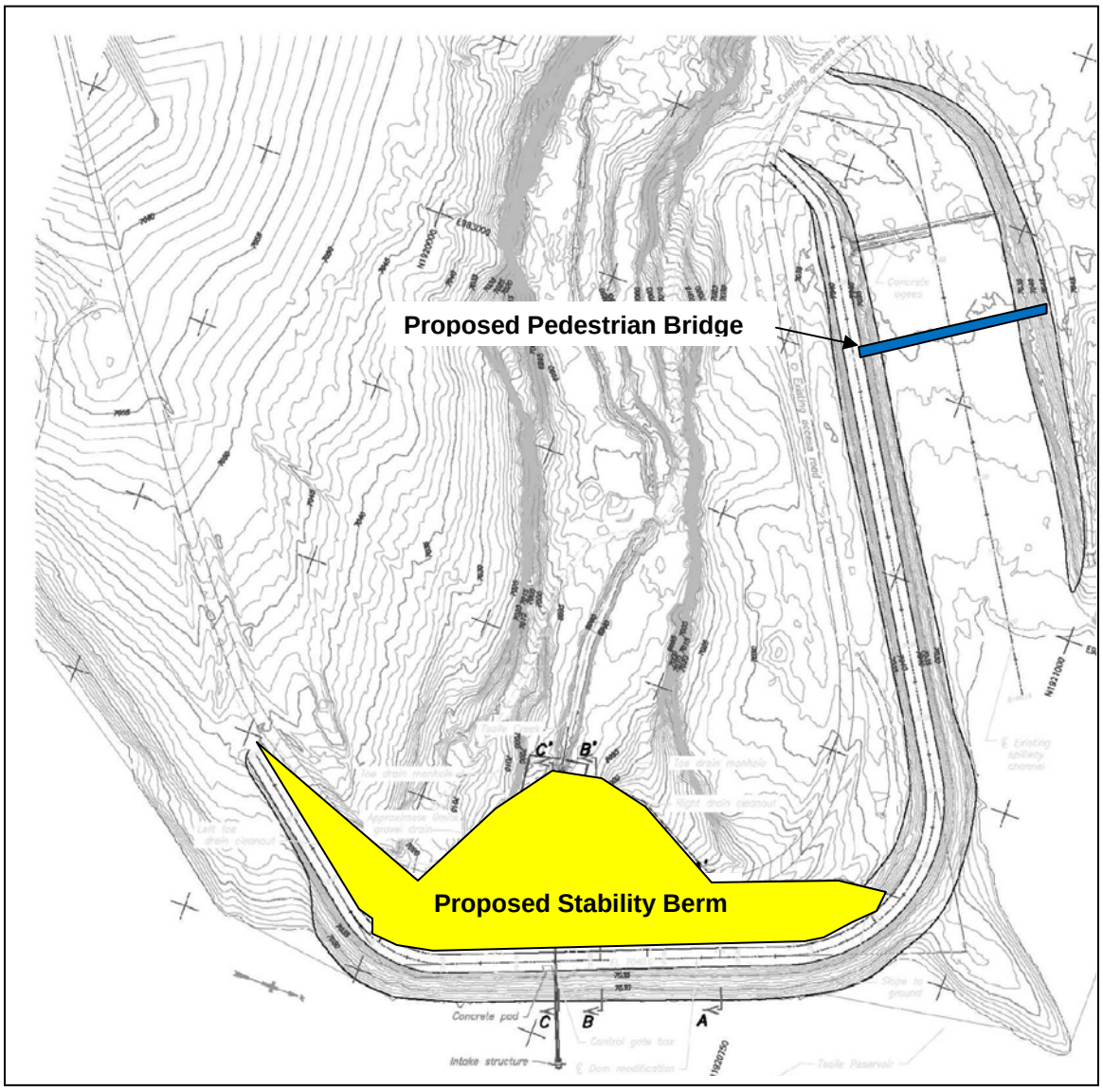

Figure 5. Embankment configuration with new stability berm and bridge.

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This chapter presents the existing conditions in the project area and the environmental consequences that would result from no action and from implementation of the action alternatives.

3.1 WATER RESOURCES

3.1.1 Affected Environment

Tsaile Creek is located within the San Juan River Basin. The Tsaile Creek drainage originates near the crest of the Chuska Mountains approximately 13 miles northeast of Tsaile Reservoir and flows generally southwest through Canyon del Muerto, in Canyon de Chelly National Monument, to Chinle Wash. Drainage area elevations vary from 9,783 feet at Roof Butte to 5,610 feet at the confluence with Chinle Wash. Elevation of the stream at Tsaile Dam is approximately 6,984 feet. Stream discharges are influenced by snowmelt and monsoon storms that produce high flows in early spring and flashy and unpredictable flows in late summer. Monsoon storms typically account for about 40 percent of the precipitation within the drainage. In a typical year, stream flow into Tsaile Reservoir ranges from a low of 2.5-3.5 cfs in the fall to a high of 40-65 cfs in the spring, with instantaneous peak flows up to 100-150 cfs (Lameman et al. 2004).[1] The 100-year instantaneous peak flow is estimated to be 700 cfs (Reclamation 2007).

Tsaile Dam is an earth-fill embankment located on Tsaile Creek immediately upstream from the head of Canyon del Muerto. The dam intercepts runoff from a 60 square mile area that forms the upper Tsaile Creek watershed. Tsaile Reservoir has a storage capacity of 5,500 acre-feet at the spillway crest elevation of 7,029.4 feet. Maximum pool depth at the inlet structure was approximately 34 feet when the lake was filled in 1964; however, several feet of sediment have since covered the lakebed along the upstream toe of the dam.

Prior to 2000, operational releases from Tsaile Dam were made through the 24-inch diameter outlet works pipe. Due to deterioration of this pipe, routine use of the outlet works was suspended and its function replaced by two temporary siphons (12 and 16 inch diameter) that were installed in 1999 and 2000. These siphons have a combined discharge capacity of approximately 20 cfs (Figure 6). Portable pumps are sometimes used to supplement the siphons when inflows from snowmelt or storms raise the water surface above the restricted maximum operating elevation of 7,023 feet. Discharge volumes up to 46 cfs have been achieved through the combined use of pumps and siphons. Despite current operational restrictions, significant inflows from high-level floods are still capable of filling the reservoir and spilling over the spillway (Figure 7), requiring the concerted use of siphons and pumps to drawdown the reservoir to the restricted level.

[1] Streamflow data derived from NNDWR gaging station located approximately 3 miles upstream from Tsaile Reservoir.

During periods when the siphons are not in use, seepage from the toe drains and outlet works sustain a baseflow of less than 0.2 cfs in Tsaile Creek immediately downstream of the dam. Discontinuous reaches of perennial to nearly perennial flow and shallow pools persist in the creek for approximately 2.1 miles downstream of Tsaile Dam. This condition is sustained by seepage from the dam, periodic releases from the siphons, natural seeps, and at least one significant spring along the creek.

Operation of Tsaile Dam has modified late winter and early spring base and peak flows in Canyon del Muerto. The dam has changed historic flow patterns from relatively short-lived, intense runoff into extended periods of runoff that in some years delayed access into the canyon and may have increased the erosive potential of the flow (NRCS 2000). Within the canyon, higher levels flow from the reservoir and flows from springs, rim spill-off, and side canyons promote refill of alluvial deposits and shallow water-table aquifers. This shallow groundwater provides baseflow to the main channels during the winter and early spring. At other times of the year, stream flow is dependent upon releases from Tsaile Dam and local runoff from storms and springs. Flow in the lower 23-mile reach of Tsaile Creek, which includes most of mainstem Canyon del Muerto, is intermittent.

Figure 6. View of siphons on downstream embankment of Tsaile Dam. Siphons were operating at a discharge rate of 20 cfs (April 2005).

Figure 7. Spillway discharge from Tsaile Reservoir (April 2005).

3.1.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct effect to water resources because no project would be implemented. Releases from the reservoir would continue to be made through the existing siphons. Active pumping would supplement the siphons to maintain the restricted water level. Continued internal erosion of the embankment could result in additional drawdown of Tsaile Reservoir in the long term.

Alternative A (Preferred Action)

Under the Preferred Action, active pumping would be utilized in concert with the existing siphons and outlet works to gradually drain the lake. Approximately 50 percent of the lake's hydraulic height down to elevation 7,015 feet could be drained with the siphons. The remaining pool (approximately 2,800 acre feet) would be evacuated using the outlet works and pumps. Use of the outlet works to evacuate a portion of the lower pool would provide cost savings to the project. No safety risk to the public or damage to the outlet works is anticipated as long as non-pressurized flow is released. The maximum non-pressurized discharge rate for the outlet works would be recalculated as head pressures decrease in response to decreasing water levels.

The reservoir would be gradually dewatered beginning in September 2011. Maximum discharge during dewatering would not exceed 20 cfs. Once the reservoir is completely drained, an earthen cofferdam would be constructed around the intake structure. The cofferdam would be capable of impounding a 10-year flood[2] while providing 2 feet of freeboard. Storage capacity of the cofferdam would be 1,250 acre feet. A pumping capability up to 20 cfs would be utilized to convey stream flow and storm water past the cofferdam to Tsaile Creek. Inflows in excess of 20 cfs would be temporarily stored behind the cofferdam and gradually pumped into the creek. These dewatering releases would provide relatively continuous stream flow that would contribute to recharge of shallow alluvial aquifers in Canyon del Muerto. Based on empirical evidence, discharges of less than 20 cfs from Tsaile Dam are not likely to affect channel stability or contribute to bank erosion in the canyon. If problematic conditions develop at particular flow rate, flows would be decreased until desirable conditions are achieved.

The U.S. Army Corps of Engineers (COE) regulates the discharge of fill material to waters of the United States, pursuant to Section 404 of the Clean Water Act (CWA), and issues permits for actions proposed within such waters. Jurisdictional, non-tidal waters of the United States regulated by the COE are defined in 33 CFR 328.4 (c) as those that comprise the area of a water course that extends up to the ordinary high-water mark (OHWM). Based upon a preliminary jurisdictional delineation completed for the project, the OHMA of Tsaile Reservoir has been determined to be at elevation 7,030.4 feet (Figure 3). Approximately 2.9 acres of jurisdictional waters would be affected by extraction of soil from the borrow areas. The cofferdam and temporary haul road along the upstream toe of the dam would affect 0.3 acre below the OHWM. CWA Section 404 permit and Section 401 water quality certification would be obtained prior to construction.

Construction would be completed in time to impound flows associated with runoff from winter storms and snowmelt in early 2014. The rate at which the lake returns to normal operating levels would depend on the volume of inflows from Tsaile Creek. During refilling, at least 0.2 cfs would be released through the outlet works to sustain a base flow in the 2-mile reach of Tsaile Creek below the dam. Higher level releases would be made periodically to provide pulses of stream flow further downstream. This would afford some opportunity for stream channel wetting and shallow aquifer recharge. Once the reservoir is filled, seepage from the toe drain system and releases from the outlet works would be sufficient to fully restore pre-construction hydrological conditions in the creek. The rehabilitated outlet works would have a maximum discharge capacity of approximately 35 cfs when the lake surface is at the spillway crest elevation.

Following construction, the SOD operating restrictions would be cancelled and the spillway crest elevation of 7,029.4 feet would be restored as the designated top of active storage. This would allow unrestricted use of the reservoir's storage capacity.

[2] The 10-year peak flow is estimated to be approximately 812 cfs.

Alternative B

The impacts of Alternative B would be similar to those described for the Preferred Action. Total replacement of the outlet works would require construction dry-up of the reservoir for up to 30 months, resulting in downstream hydrological effects that could persist for 9 months longer than those effects that are anticipated under the Preferred Action. Dewatering protocol would be the same as described in the Preferred Action. Refill of the reservoir would likely commence in September 2014 and continue through spring of 2015.

Cumulative Impacts

Historic disturbances that affect Tsaile Creek include logging, grazing, and various agricultural practices. Within Canyon del Muerto, the canyon-bottom contains hundreds of vehicle, pedestrian, and livestock trails which contribute to unnatural drainage patterns and cause bank cutting and incision of the stream channel (NPS 2005). Water releases during construction are not expected to have an effect on stream channel morphology in the canyon. Dewatering flows would potentially improve conditions for shallow aquifer recharge in the canyon during the first two years of construction. Conditions in the canyon would be less favorable for recharge while the reservoir is being refilled during the spring of 2014. There would be no effect to Tsaile Creek upstream of the reservoir.

3.2 LAND USE AND RECREATION

3.2.1 Affected Environment

Tsaile Dam and about a third of the reservoir are situated in the indefinite boundary of Canyon de Chelly National Monument. In 2010, the NPS issued 21,973 permits to people (park visitors, guides, and some residents) entering the canyons of the national monument. An unimproved park road with several low-water crossings of Tsaile Creek affords vehicular access to tour groups and residents entering Canyon del Muerto. More than 12,000 jeep tours were conducted in the national monument in 2010. These tours enhance visitor experience by providing direct exposure to the cultural and natural resources of the canyon.

The land encompassing Tsaile Reservoir consists of a patchwork of rangeland and pinyon-juniper/ponderosa pine forest. Land uses within this area include livestock (sheep and cattle) grazing and water-based recreation. Timber management areas are limited to the upper watershed in the Chuska Mountains. Croplands are present along Tsaile Creek upstream of Navajo Route 12. Historically, Navajo farmers upstream of the reservoir have planted corn, melons, squash, and beans, with the addition of alfalfa in the 20th century.

Navajo homes and farms are scattered along the canyon floors of the national monument. Approximately 50 Navajo families reside in the monument's canyons on a seasonal basis (NPS 2005). Agricultural fields in Canyon del Muerto produce corn, squash, melons,

alfalfa, and various fruits. These fields include both irrigated and dryland pastures, croplands, orchards, and fenced rangelands. Although farming is not as prevalent as it once was, this activity still occurs in parts of the canyon more than 9 miles downstream of Tsaile Dam. As late as 1997, approximately 44 of 486 cleared acres in the main Canyon del Muerto were irrigated with water supplied from Tsaile Creek (NRCS 2000). Approximately 72 percent of the cleared acres appeared to be historically dry land (NRCS 2000). The present-day acreage under cultivation within the monument has decreased to an estimated range between 150-200 acres. The NPS is attempting to reverse this downward trend and encourage conditions that are suitable for the continued practice of agriculture.

Tsaile Reservoir is a popular recreational venue accessible from unpaved roads that intersect Navajo Routes 12 and 64. Recreation functions at the lake are administered by the Navajo Nation Department of Fish and Wildlife (NNDFW). There are no developed recreational facilities. Camping is allowed by permit along the shore. Visitor use data compiled by eagle nest watch personnel in 2007 suggest that anglers (66.5 percent), picnickers (10.5 percent), and campers (7.8 percent) are the primary user groups (Stephens and Rainbolt 2007). The reservoir is managed primarily as a put-and-take trout fishery, although catfish provide a popular secondary fishery. Public use of the reservoir occurs mostly in late spring to early fall. Winter freezing precludes most use during the coldest months of the year.

3.2.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct effect to land use or recreation because no project would be implemented. The existing SOD drawdown would continue to depress recreational values of Tsaile Reservoir. Any further drawdown of the reservoir would adversely affect management of the lake as a trout fishery and preclude potential future water storage opportunities that could benefit downstream irrigators. Without corrective action, public safety concerns regarding the condition of Tsaile Dam would persist into the foreseeable future.

Alternative A (Preferred Action)

The project would introduce temporary adverse effects on recreation during the 21-month construction period. Draining the reservoir for construction would eliminate the sport fishery and necessitate a restocking program by NNDFW once normal lake operations resume. Construction would disrupt passive and active use of the lake area for other recreational activities including picnicking, camping, and sightseeing. There would be no affect on grazing or upstream water use.

Dewatering releases from the reservoir prior to and during construction would be monitored and adaptively controlled to ensure that vehicular access into the canyon is not impeded. No adverse impact on visitor or resident access is anticipated.

Construction dewatering would provide stream flow that could be diverted by canyon farmers to irrigate croplands and orchards during the growing seasons in 2012 and 2013. Those flows potentially would have a beneficial effect on agricultural production. While the reservoir is being refilled, the NNDWR would balance water retention with water releases to ensure some stream flow is periodically available in the canyon for groundwater recharge and diversion. The frequency and volume of releases would be determined by the NNDWR.

Following construction, pre-2000 reservoir levels would be restored. This would improve conditions for water-based recreation, water storage, and potential future irrigation releases.

Alternative B

The impacts to land uses from construction dewatering would be similar to those described for the Preferred Action, except the duration for total replacement of the outlet works would require a longer dry-up period. Dewatering releases from the reservoir would potentially benefit downstream irrigators during the growing seasons in 2012-2014. Less water would be available for diversion while the reservoir is being refilled during the following spring. Implementation of Alternative B would curtail water-based recreation for more than 30 months.

Cumulative Impacts

The incremental effect of the proposed project would be to improve hydrological conditions for water diversion within Canyon del Muerto during the first 2 years of construction. Downstream conditions would be less favorable while the reservoir is being refilled. Resumption of normal lake operations and water storage would improve conditions that could facilitate irrigation releases in the future. During construction, the loss of angling and other water-based recreational opportunities would be cumulative to similar losses at other lakes within the region, such as those that have resulted from the SOD drawdown at Red Lake on the Navajo Nation.

3.3 GEOLOGY AND SOILS

3.3.1 Affected Environment

Tsaile Dam is located at the head of Canyon del Muerto on the Defiance Plateau. The Defiance Plateau is formed from a sinuous monoclinal uplift which extends from Fort Defiance northward along the western slope of the Chuska Mountains. Nearly level or gently folded sedimentary rocks, incised by canyons, characterize the Defiance Plateau (NRCS 2000). Foundation bedrock at the dam site consists of upper Triassic period Chinle Formation course grey to light brown sandstone with minor amounts of shale and mudstone (Reclamation 2002).

Upland soils encompassing the project area are coarse textured, shallow to very shallow (4 to 20 inches), well-drained, and formed in residuum from sedimentary and igneous parent material. Alluvial deposits overlie bedrock within the floodplain, terraces, and fans of Tsaile Creek and the bottom of Tsaile Reservoir. The surficial alluvial deposits consist of unconsolidated sand with lesser amounts of clay, silt, and gravel.

Rangeland conditions vary throughout the Tsaile Creek watershed. Livestock grazing within the riparian zone and on upland slopes has reduced vegetative cover and accelerated storm runoff and sediment transport into Tsaile Reservoir and increased land erosion in Canyon del Muerto. The ecological condition of the riparian zone and the surrounding upland areas, accessible to livestock, ranges from poor to fair (NRCS 2000).

Land erosion patterns in Canyon del Muerto have been influenced by various natural and anthropogenic events in the watershed including runoff from the canyon rims, high-level stream flow, agriculture, logging, the invasion of nonnative plants such as tamarisk and Russian olive, and the presence of roads and trails (NRCS 2000). Invasive plant infestations have seriously altered stream processes creating unnatural rates of channel incision and land erosion (NPS 2005). The NPS has implemented several programs in the monument's canyons to control land and stream bank erosion, including bank armoring and removal of tamarisk and Russian olive.

3.3.2 Environmental Consequences

No Action Alternative

Under the no action alternative, there would be no direct effect to soils because no project would be implemented. Existing soil erosion and sedimentation trends in the project area and Canyon del Muerto would likely persist into the foreseeable future.

Alternative A (Preferred Action)

At 6.8 acres, the two borrow areas constitute the largest collective area potentially affected by construction. Borrow activities at these sites would be required to obtain sufficient quantities of suitable material to construct the new stability berm. Existing roads would be used for haulage between the borrow areas and Tsaile Dam to the maximum extent practicable.

A temporary cofferdam would be constructed to protect the work area at the inlet structure. The cofferdam would be constructed of lakebed alluvium. Access to the inlet structure would be by means of a temporary haul road constructed in the dewatered reservoir along the upstream toe of the dam. Once the cofferdam is in place, sediments around the inlet structure would be excavated and removed. Approximately 0.3 acre in the dewatered lakebed would be affected by the cofferdam, inlet structure excavation, and haul road.

Construction of the stability berm would affect approximately 2.6 acres on the downstream embankment and toe area of Tsaile Dam. Construction haulage to this site would utilize existing roads. Staging and stockpiling areas required for construction would affect approximately 2 acres north of the spillway.

Construction of the pedestrian bridge would impact an estimated 0.03 acre consisting of bedrock in the spillway channel and upland soils at the abutments.

Dewatering discharges from Tsaile Reservoir are not expected to accelerate channel erosion in Canyon del Muerto.

After construction, land contours in work areas is not required for permanent facilities such as the dam and outlet works would be restored to conform to original conditions. Where appropriate, disturbed areas would be stabilized according to best management practices and controls identified in a storm water pollution prevention plan.

Alternative B

Ground disturbances associated with material extraction from borrow sources, material staging/stockpiling, embankment modification, and other construction activities would be similar to those described in the Preferred Action. An additional 0.15 acre would be impacted on the dam during removal and replacement the outlet works.

Cumulative Effect

Construction effects to soils would incremental to historic and ongoing natural and anthropogenic events that have resulted in ground disturbances and erosion. Soils in Canyon del Muerto would not be adversely affected by construction. Following construction, soil impacts would be mitigated through the application of appropriate erosion control measures.

3.4 BIOLOGICAL RESOURCES

3.4.1 Affected Environment - Vegetation

The project area is comprised of three major vegetative communities: Rocky Mountain Conifer Forest, Great Basin Conifer Woodland, and Great Basin Desertscrub (Brown 1994).

Rocky Mountain Conifer Forest. The Rocky Mountain Conifer Forest occurs from Rocky Mountains to as far south as southern Arizona. Rocky Mountain Conifer Forest is characterized by ponderosa pine (*Pinus ponderosa* var. *scopulorum*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), Gambell oak (*Quercus gambelii*), and white fir (*Abies concolor*). Within the project area, Rocky Mountain Conifer Forest occurs in slightly higher elevation areas, generally south and east of the reservoir.

Great Basin Conifer Woodland. The Great Basin Conifer Woodland is a cold-adapted community characterized by the presence of juniper (*Juniperus* sp.) and pinyon pine (*Pinus* sp.). Junipers have invaded large areas of former grasslands and tend to be found at lower elevations than pinyons. Junipers occur on deeper soils below 6,500 feet in elevation. At higher elevations, important plant associations include Gambel oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus*), and skunkbush sumac (*Rhus trilobata*). Other important shrubs include cliffrose (*Cowania mexicana*), Apache plume (*Fallugia paradoxa*), and fourwing saltbush (*Atriplex canescens*) (Brown 1994). Within the project area, the Great Basin Conifer Woodland generally occurs to the north and west of the reservoir.

Great Basin Desert Scrub. The Great Basin Desertscrub is the most northerly of the four North America deserts. Major plant dominants in this cold-adapted community include big sagebrush (*Artemisia tridentata*), blackbrush (*Coleogyne ramosissima*), and shadscale (*Atriplex confertifolia*). Species diversity is characteristically low in all major communities of this biome, with typically a dominant shrub occurring to the virtual exclusion of other woody species. Great Basin Desertscrub has evolved a distinct fauna. However, large ungulates are generally poorly represented. Pronghorn may occasionally use habitat coming over from adjacent grasslands. Reptiles are not as well represented in the Great Basin Desertscrub as in warmer biomes because of the desert's long, cold winters. Within the project area, Great Basin Desert Scrub vegetation is generally limited to a large tract of land immediately north of the reservoir and isolated patches around the margin of the reservoir.

In addition to these major vegetative communities there is a 0.3-acre Juncus-dominated wetland approximately 80 feet downstream of the toe of the dam near the right abutment. Stands of Juncus and other vegetation in this wetland have been closely cropped to the ground by frequent grazing. The wetland vegetation relies on water from a small seep originating out of the base of a rock ledge. This seep is likely in part fed by water forced through the rock by the water in the reservoir.

Riparian vegetation has not had the opportunity to develop adjacent to reservoir primarily due to the fluctuating water level. While recreation plays a role in limiting some non-riparian vegetation in the area, it is likely not the limiting factor preventing riparian vegetation colonization at the margins of the reservoir. Fluctuating water levels and wave action have created a scour ring around the reservoir that is mostly devoid of perennial vegetation.

3.4.2 Environmental Consequences - Vegetation

No Action

Existing habitat conditions and biological communities would persist into the foreseeable future unless SOD concerns require additional lowering of reservoir levels. Vegetative communities would continue to be affected by grazing, off-highway vehicle use, and recreational activities. Substantial additional, long-term drawdown of the reservoir due

to embankment instability potentially would reduce flows to the seep below the dam and diminish wetland conditions.

Alternative A (Preferred Action)

Impacts to vegetation would be primarily limited to areas where clearing and grubbing would result from construction. These areas are likely to include staging, stockpiling, borrow areas, and the area in the immediate vicinity of the dam. It is not anticipated that appreciable vegetation disturbance would be required for haul roads because construction traffic would generally use the existing road network or travel on the dewatered section of the reservoir bed.

The Juncus wetland below the dam would not be directly impacted by the project. Prior to the initiation of construction, the wetland would be fenced off with drift fencing. While active construction is occurring, the onsite construction inspector would monitor the condition of this fence and coordinate any repairs necessary to prevent construction activities from entering the wetland. While the drawdown of the reservoir during construction will reduce the pressure forcing some of the seepage, it is anticipated that seepage would remain as a result of the water retained in the rocks, precipitation, and potentially from water retained behind the coffer dam or other sources. Resumption of normal lake operations following construction would sustain seepage from the rock ledge and benefit the wetland in the long-term.

Construction of the stability berm and replacement of the outlet works would result in disturbance to approximately 5 acres of already highly disturbed lands primarily consisting of the existing dam face which is generally devoid of vegetation other than grasses and other annuals.

The borrow area would result in disturbance of approximately 6.8 acres. Of these 6.8 acres, 2.9 acres of disturbance would occur within the existing reservoir below the full pool elevation. The remaining 3.9 acres of disturbance outside the reservoir pool can be divided into 3.1 acres of previously disturbed Great Basin Desert Scrub and 0.8 acre of Great Basin Conifer Woodland.

The 35-acre tract of land where the contractor would select the 2-acre staging and stockpiling area includes several highly disturbed areas that are devoid of significant vegetation, interspersed with stands of big sagebrush. Depending on the final selection of staging and stockpiling area, up to 2 acres of Great Basin Desert Scrub may be impacted.

Additional disturbance would occur within the dewatered pool for construction of the cofferdam and other ancillary construction activities. No vegetation is anticipated to be impacted by these activities, other than annuals that may grow up after the reservoir is drawn down.

Rocky Mountain Conifer Forest is outside the project footprint and would not be impacted.

Alternative B

Impacts to vegetation under Alternative B are anticipated to be similar to those impacts analyzed under Alternative A. Due to the additional time need for construction, recovery of vegetation would be delayed by up to 9 months over alternative A.

3.4.3 Affected Environment – Wildlife

Birds. Tsaile Reservoir supports a few different habitat types which in turn support different bird assemblages. The open water of the reservoir supports typical aquatic birds such as mallard, redhead duck, American coot, western grebe, great blue heron, Canada geese, and greater yellowlegs (NPS 2005; AZFO 2011). Habitat conditions for aquatic birds at Tsaile are generally poor as compared to other nearby lakes such as Wheatfields and Red Lake which attract significantly greater numbers of birds (Chad Smith, NNDFW, pers. comm.).

The lack of riparian vegetation has limited the habitat available for riparian obligate species. Upland habitats support a variety of birds including: common raven, chipping sparrow, sage sparrow, vesper sparrow, turkey vulture, mountain bluebird, violet-green swallow, northern rough-winged swallow, and bald eagle.

Mammals. Although few surveys have been conducted, Tsaile Reservoir and the project area likely support a variety of mammals because of its location in an intergrade zone between the Chuska Mountains and Canyon del Muerto. Brugess (1973) reported the following mammals in vicinity of Tsaile Reservoir: dusky shrew (*Sorex monticolus*), fringed Myotis (*Myotis thysanodes*), rock squirrel (*Spermophilus variegatus grammurus*), Botta's pocket gopher (*Thomomys bottae*), northern pocket gopher (*Thomomys talpoides fossor*), deer mouse (*Peromyscus maniculaius*), pinyon mouse (*Peromyscus truei truei*), white-throated wood rat (*Neotoma albigula laplataensis*), North American porcupine (*Erethizon dorsatum couesi*), mule deer (*Odocoileus hemionus hemionus*), and badger (*Taxidea taxus*).

Gunnison's prairie dogs (*Cynomys gunnisoni*) occur in the project area. One small colony (<0.20 acre; 0.08 hectare) occurs at and below the full pool line of the reservoir. Although no prairie dogs were seen during a site visit it is assumed that this area has prairie dog activity because of the presence of burrows and other evidence. Based on documented Gunnison's prairie dog densities it is anticipated that this colony consists of less than 6 individual prairie dogs[3].

Reptiles and Amphibians. No known reptile/amphibian surveys have been conducted in the immediate vicinity of Tsaile Reservoir. During two site visits, terrestrial gartersnake (*Thamnophis elegans*) were found in the wetland below the dam. Surveys in the greater Canyon de Chelly National Monument area have documented common sagebrush lizard

[3] Gunnison's prairie dog colony density reported in the literature varies from low of 1 prairie dog per acre to a high of 28 per acre (Lupis et al. 2007). Based on the size of the Tsaile colony (<0.20 acres) this colony could support between 0.2 prairie dogs and 5.6 prairie dogs.

(*Sceloporus graciosus*) and plateau striped whiptail (*Aspidoscelis velox*). Amphibians documented in the national monument area include: tiger salamander (*Ambystoma tigrinum*), red-spotted toad (*Bufo punctatus*), and Woodhouse toad (*Bufo woodhousii*), canyon treefrog (*Hyla arenicolor*), and at least one species of spadefoot toad (*Spea* sp.).

3.4.4 Environmental Consequences - Wildlife

No Action

Under the no action alternative, there would be no direct to wildlife because no project would be implemented. Existing habitat conditions and biological communities would persist into the foreseeable future unless SOD concerns require additional lowering of reservoir levels. Substantial additional drawdown of the reservoir due to embankment instability could result in continued decline of aquatic and shore habitat for wildlife. Additional drawdown of the reservoir would also reduce the available water for wildlife. This would reduce the shoreline and serve to concentrate the existing human recreation and wildlife uses of the reservoir resulting in increased interactions among wildlife, and between humans and wildlife.

The small existing prairie dog colony may occasionally become partially inundated if the reservoir exceeds its reduced operating level as the result of high inflows from Tsaile Creek. If future SOD concerns require additional lowering of the reservoir pool, this would in turn lessen the potential for inundation of the colony to the extent that the siphons and pumps are capable of handling these high inflows.

Alternative A (Preferred Action)

The preferred action would result in temporary and limited longer-term construction related impacts to wildlife.

Construction activities have the potential to directly or indirectly impact 13.5 acres of terrestrial wildlife habitat. Potential effects of the project include short-term loss of plant cover, dust emissions, noise, and other disturbances caused by equipment operation and human activity. However, existing wildlife in the area is currently accustomed to direct and indirect effects of recreational activity. Temporary displacement of small mammals and reptiles would likely occur on sites where ground cover is removed, such as the borrow area. Construction activities also have potential to cause direct mortalities through crushing of smaller mammals, reptiles, and amphibians. Approximately 90 percent of the 0.2-acre area encompassing the prairie dog colony would be directly affected by borrow activity.

It is anticipated that larger, more mobile wildlife would avoid the area when active construction is occurring. It is also anticipated that this impact would be minimal as most wildlife in the area are likely accustomed to human activity associated with the frequent recreational use of the reservoir. Project dewatering of the reservoir would impact waterfowl and shorebirds by reducing available aquatic habitat during the construction

period and through refilling. These impacts are anticipated to last for approximately 5 months of dewatering, 21 months of construction, and one spring for refilling. For waterfowl there would be two breeding seasons before the reservoir appreciably refills. The most notable effects of dewatering on migratory birds would be localized to the project area. No significant negative regional impacts are anticipated due to lack of appreciable nesting habitat at Tsaile Reservoir and due to the proximity of other water bodies in the region. These water bodies include Wheatfields Reservoir (about 8 miles) and an abundance of small water bodies in the surrounding area (approximately 90 within 8 miles of Tsaile Reservoir). Additionally, due to higher quality habitat at other area reservoirs such as Wheatfields it is anticipated that they would be capable of handling the limited number of aquatic birds displaced during the project. Upon project completion, the reservoir would be returned to its full operational pool. The long-term, cumulative impact of the project on wildlife communities would be to maintain habitat diversity by protecting the reservoir from permanent drawdown resulting from embankment instability.

Project dewatering of the reservoir would also reduce the available water for terrestrial wildlife. The impacts of reduced water and increased disturbance are likely to be mitigated in the short-term by the proximity of Tsaile Creek and the abundance of intermittent and permanent water impoundments in the project vicinity (> 30 within 5 miles of Tsaile Reservoir). These impacts are anticipated to last for approximately 5 months of dewatering, 21 months of construction, and one spring for refilling. Impacts would persist through two summer seasons before the reservoir appreciably refills.

Alternative B

Impacts to wildlife as a result of Alternative B are anticipated to be similar to those impacts analyzed under Alternative A. Due to the construction schedule, construction related impacts would be extended from the 21 months in Alternative A to up to 30 months in Alternative B. Impacts of construction and drawdown would be extended to 35 months in alternative B resulting in three summers where Tsaile Reservoir would not have significant water.

3.4.5 Affected Environment - Fish

Tsaile Reservoir is maintained as a recreational fishery by the NNDFW and is stocked with rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarkii*), brown trout (*Salmo trutta*), and channel catfish (*Ictalurus punctatus*). In addition to stocked species, Tsaile Reservoir is also known to contain green sunfish (*Lepomis cyanellus*), bullhead (*Ameiurus* sp.), and goldfish (*Carassuis auratus*).

In 2006, surveys of Tsaile Creek downstream of the dam recorded abundant fathead minnow (*Pimephales promelas*) and green sunfish. Native bluehead suckers (*Pantosteus discobolus*) and speckled dace (*Rhinichthys osculus)* were considered rare as only two of each were found (Clarkson and Marsh 2006). During sampling in 2007, NPS also documented green sunfish and goldfish (Trammel 2008). These 2007 surveys

documented how Tsaile Creek below the dam is dominated by fathead minnow (325 captured) and by virile crayfish (*Orconectes virilis*) (15 captured), while the most prevalent native fish (bluehead sucker) only had 5 captured (Trammel 2008).

3.4.6 Environmental Consequences - Fish

No Action

Existing habitat conditions and biological communities would persist into the foreseeable future unless SOD concerns require additional lowering of reservoir levels. Substantial additional drawdown of the reservoir due to embankment instability could result in continued decline of aquatic habitat. In lieu of the proposed project, the NNDFW would rehabilitate the Tsaile fishery by removing goldfish and sunfish as discussed under cumulative impacts.

Alternative A (Preferred Action)

It is anticipated that following dewatering, the reservoir would either be nearly dry or have a minimal pool that has significant potential to freeze solid during the winter. As a result of this drying or freezing, the existing lentic habitat would be substantially reduced or eliminated during construction. Tsaile Creek above the reservoir is perennial and flows at 2-3 cfs during low-flow periods. Because Tsaile Creek above Tsaile Reservoir is perennial, pumps maintaining the drawdown during construction are also anticipated to maintain perennial flow in portions of Tsaile Creek below the dam. In the event that the drawn-down pool freezes, inflows to Tsaile Reservoir would continue to be pumped over the dam thereby maintaining flow in Tsaile Creek immediately below the dam.

Connected with this project, NNDFW proposes to translocate a portion of the sport fish (trout and catfish) from Tsaile Reservoir to a small unnamed lake approximately ½ mile to the east-northeast of the reservoir. In addition to this unnamed lake, sport fish may be opportunistically translocated to other water bodies in the greater Tsaile area as conditions allow. NNDFW may also adjust the take limit on the Tsaile fishery as the reservoir is being drawn down to prevent a large-scale fish kill.

At the completion of the project, during reservoir refilling, at least 0.2 cfs would be released through the outlet works to sustain a base flow in Tsaile Creek below the dam. Higher level flows would be periodically released to afford wetting of the stream channel further downstream. Once the reservoir is filled, seepage from the toe drain system would be sufficient to support base flow in the creek. After refilling, the NNDFW proposes to restock the reservoir with trout and catfish.

The impact on the fishery would persist for approximately 5 months during dewatering, 21 months during construction, and one spring during refilling. For fishery resource, there would be two summers before the reservoir appreciably refills and would be restocked.

Alternative B

Impacts to fish as a result of Alternative B are anticipated to be similar to those impacts analyzed under Alternative A. Due to the construction schedule, construction related impacts would be extended from the 21 months in Alternative A to up to 30 months in Alternative B. For fish there would be three summers before the reservoir appreciably refills and would be restocked.

Cumulative Effect

The NNDFW proposes to rehabilitate the Tsaile fishery under any action alternative or under the no action alternative. If the Alternative A or B is chosen, the rehabilitation of the Tsaile Fishery would be necessitated by dry-up or winter freezing of any remaining minimal pool. As the reservoir refills it would be restocked with the species of fish currently in the reservoir except for goldfish and green sunfish.

Under Alternative A or B, this rehabilitation is anticipated to coincide with the proposed SOD project drawdown; however, under the no action alternative, rehabilitation of the fishery would proceed as an independent action of the NNDFW. The Navajo Nation as operator of the dam may drawdown the reservoir at anytime without restrictions. In lieu of the proposed drawdown, the NNDFW would use a chemical piscicide such as Rotenone to remove undesirable fish species from the reservoir.

While the proposed project would have the effect of facilitating the restocking of a subset of the current fish assemblage in the reservoir, this change in species composition is not different from future baseline conditions that would be anticipated under the no action alternative. The cumulative effect of the proposed project would be to improve aquatic conditions that support the sport fishery, but there would be no difference in future fish composition between any of the alternatives including no action.

3.4.7 Affected Environment - Special Status Species

Numerous special status species have potential to occur in the greater Tsaile area because it is a transition zone between the higher elevations of the Chuska Mountains and the lower elevations of Canyon del Muerto (Table 1). In this section, “project footprint” refers to the area of disturbance for the project, and “project area” refers to a more expansive area and includes the area that may impact the species under discussion. For Endangered Species Act (ESA) listed species, the term “action area” is used to represent all areas directly or indirectly impacted by the project including areas in Tsaile Creek downstream of Tsaile Reservoir.

Table 1. Special status species potentially occurring in the project area[1].

Species	Federal Status[2]	Navajo Nation Status[3]
American dipper *(Cinclus mexicanus)*		3
Sora (*Porzana carolina*)		4
Three-toed woodpecker (*Picoides tridactylus)*		4
Mexican spotted owl *(Strix occidentalis lucida)*	Threatened	3
Western seep fritillary *(Speyeria nokomis)*		3
Golden eagle *(Aquila chrysaetos)*	BGEPA	3, EPA
Clark's grebe (*Aechmophorus clarkii*)		4
Northern saw-whet owl (*Aegolius acadicus*)		4
Bluehead sucker *(Castostomus discobolus)*		4
Rocky Mountain elk (*Cervus elaphus nelsoni*)		Economic
Yellow-billed cuckoo (*Coccyzus americanus)*	Candidate	2
Blue grouse *(Dendragapus obscurus)*		4
Yellow warbler *(Dendroica petechia)*		4
Southwestern willow flycatcher *(Empidonax traillii extimus)*	Endangered	2
Peregrine falcon *(Falco peregrinus)*		4
Bald eagle *(Haliaeetus luecocephalus)*	BGEPA	3, EPA
Wild turkey *(Meleagris gallopavo)*		Cultural, Economic
Black-footed ferret *(Mustela nigripes)*	Endangered	2
Mule deer *(Odocoileus hemionus)*		Cultural, Economic
American band-tailed pigeon *(Patagioenas fasciata)*		4
Northern leopard frog *(Rana pipiens)*		2
Tree swallow (*Tachycineta bicolor)*		4
Black bear *(Ursus americanus)*		Cultural, Economic
Gooding's onion (Allium goddingii)	Candidate	3
Utah bladder-fern *(Cystopteris utahensis)*		4
Rhizome fleabane *(Erigeron rhizomatus)*	Threatened	2
Navajo bladderpod (*Lesquerella navajoensis)*		4
Navajo Sedge (*Carex specuicola)*	Threatened	3

1 Source: NNDFW 2011, Mikesic 2008, and FWS county list at: http://www.fws.gov/southwest/es/arizona/Documents/CountyLists/Apache.pdf.

2 Federal Protection: Threatened = Threatened under the Endangered Species Act; Endangered = Endangered under the Endangered Species Act; Candidate = Candidate species listed under the Endangered Species Act; BEGPA= Bald and Golden Eagle Protections Act.

3 Navajo Protection: Navajo Nation Endangered Species List, September 2008 (refers to status on Navajo Nation): 1 = no longer occur on the Navajo Nation; 2 = Endangered – a species or subspecies whose prospects of survival are in jeopardy; 3 = Endangered - a species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future; 4 = insufficient information on status of species or subspecies for listing as endangered; Economic = This species is of economic importance to the Navajo Nation; Cultural = This species is of cultural importance to Navajo Nation; EPA = covered by the Navajo Nation Eagle Protection Act.

American Dipper. American dippers inhabit forested areas (spruce-fir, pine, and aspen) along fast flowing mountain streams at elevations 5,000 to 13,000 feet. Dippers usually forage in streams gleaning insects from bottom substrates. Territories are linear and reflect the nature of streamside habitat. American dipper nesting has been recorded in habitat adjacent to Wheatfields Creek and is likely also found on Tsaile Creek upstream of the project area on the slopes of the Chuska Mountains. Tsaile Creek in the project area does not provide habitat for the dipper because of the high disturbance, lack of forested areas along the stream near the reservoir, slow moving water, and a silty substrate without larger cobbles that American dippers require.

Sora. Sora prefer wetland habitat with shallow water and emergent vegetation including sedges and cattails. Sora typically nest in areas of wetlands with shallow to intermediate depth water and emergent vegetation. Sora breed throughout North America south to Arizona and New Mexico. Records of sora from the Navajo Nation include the Chuska Mountains, Morgan Lake and Tuba City. Within the project limits, there is no emergent vegetation suitable for use by the sora. Downstream of the project area in Tsaile Creek there is a small patch of emergent vegetation which is about 650 feet outside the construction footprint for the dam. There is a low potential of sora using this emergent vegetation due to its small size and isolation from other areas of emergent vegetation.

Three-toed woodpecker. Three-toed woodpeckers prefer spruce, fir, aspen, or mixed conifer forests above 8,000 feet with a significant numbers of snags. The only records from the Navajo Nation are from the Chuska Mountains with potential habitat also occurring on Black Mesa and Navajo Mountain (Mikesic 2008). At an elevation of approximately 7,000 feet the project area is below the known elevational range of the three-toed woodpecker on the Navajo Nation. Additionally, there are no mixed conifer forests in the project footprint. Structurally suitable habitat in the form of ponderosa pine forests exists adjacent (~1,600 feet from edge of the footprint) to the project; however, these areas are still below the elevational range of the three-toed woodpecker. The three-toed woodpecker is not anticipated to occur in the project area because the area is lacking suitable habitat.

Mexican spotted owl. Suitable habitat for the Mexican spotted owl generally consists of mixed overstory vegetative communities that support the combined activities of nesting, roosting, and foraging. Mixed conifer forest is most often used by this species for nesting and roosting. Typical mixed stands that support roosting and nesting contain three distinct types: (1) mid-aged to mature mixed conifer stands dominated by white fir *(Abies coneolor)* or Douglas fir *(Pseudotsuga meziesii),* typically on mountain slopes, with moderate to dense canopies and multiple canopy layers; (2) steep walled narrow canyons often with riparian vegetation and cool microclimates; and (3) moderately sloped drainages with Douglas fir, in pinyon-juniper (e.g. Black Mesa) (Mikesic 2008). The FWS does not consider relatively pure stands of ponderosa pine as suitable habitat; however, pure ponderosa pine associations could be used for foraging where they are found in close proximity to other forest communities that do support nesting and roosting activity (95 FR 13606). On the Navajo Nation, suitable habitat (and documented occurrences) is located in the Chuska Mountains, Defiance Plateau, Canyon de Chelly

National Monument, and Black Mesa (Mikesic 2008). The Mexican spotted owl has not been documented at Tsaile Reservoir. The nearest record of a spotted owl is approximately 3 miles downstream of Tsaile Reservoir. No critical habitat has been designated for this species on the Nation.

Western seep fritillary. The western seep fritillary is dependent on moist meadows, seeps, marshes, and streamside habitat. Flower nectar is the food source for the butterfly. Violets (*Viola nephrophylla*) are required as a host plant for larvae. In Arizona the species' confirmed range encompasses the northeastern one-half of the State. Throughout its North American range, several populations have been lost due to draining of habitat or development. Damp areas along the margins of Tsaile Creek below the dam could potentially afford suitable habitat for this species. In the mid 1990's, only 2 areas were known from the Navajo Nation; however, 20 sites have been recently recorded (Mikesic 2008).

Golden Eagle. Golden eagles occur throughout Arizona in a variety of habitats including deserts and grasslands that afford open areas for hunting. In general, golden eagles need solitude - open areas in any season for hunting and, in nesting season, areas that are not too distant from shelves on cliffs, their equivalent, or large trees (Palmer 1988). In Arizona, cliffs are important nest sites for golden eagles; however, golden eagles would also use trees (from large ponderosa pines to small junipers) or even telephone poles (Glinski 1998). Throughout its range in North America, golden eagles prey primarily on mammals. A survey of prey remains from central Arizona revealed that jackrabbits were the most frequently captured prey followed by rock squirrels, skunks, and woodrats. The nearest concentration of nesting golden eagles is over 12 miles to the southeast in the Sonsela Buttes and Falling Iron Cliffs and approximately 16 miles to the southwest in Canyon de Chelly. Some of the more open areas dominated by sagebrush around Tsaile Reservoir provide potential foraging areas for golden eagles.

Clark's grebe. Clark's grebes occupy inland open waters of the western United States and southwestern Canada during summer breeding season. In winter some Clark's grebes remain at inland waters, while others move to the Pacific coast. Within Arizona, Clark's grebes nest at areas along the Colorado River and at various lakes. Nesting habitat includes emergent or flooded vegetation bordering open water (Wise-Gervais 2005). Clark's grebes are known to nest at Many Farms, Ganado, and Morgan lakes on the Navajo Nation (Mikesic 2008). Clark's grebes have not been documented on Tsaile Reservoir; however, the open water provides potential foraging habitat.

Northern saw-whet owl. Northern saw-whet owls generally prefer coniferous forests. The Arizona Breeding Bird Atlas documented northern saw-wet owls in Arizona primarily using mixed-conifer forests comprised of Douglas and white fir, ponderosa pine, Gambel's oak, and quaking aspen (Wise-Gervais 2005). Areas with a ponderosa pine overstory and a Gambel's oak understory are preferred to pure ponderosa pine stands (Wise-Gervais 2005). On the Navajo Nation, northern saw-wet owls have been documented in the Chuska Mountains, on Black Mesa, and on Defiance Plateau (Wise-Gervais 2005).

Bluehead sucker. This native fish typically occupies lotic habitats featuring moderate to fast flowing water above a rubble-rock substrate. The bluehead sucker has been recorded in Tsaile and Wheatfields creeks.

Yellow-billed cuckoo. The yellow-billed cuckoo's western U.S. "distinct population segment" was listed as a candidate species on July 25, 2001 (66 FR 38611). Western yellow-billed cuckoos breed in dense willow and cottonwood stands in river floodplains. On the Navajo Nation, this species is only known from several sections of the San Juan River. Potential for breeding may also occur along the Little Colorado and Colorado Rivers, within Canyon de Chelly National Monument, Chinle Valley, and other canyons or streams with appropriate habitat (Mikesic 2008). Tsaile Reservoir and the project area lack suitable cuckoo habitat.

Blue grouse. Blue grouse inhabit all major mountain ranges of the western United States and Canada, including New Mexico and Arizona. In Arizona, blue grouse is confined to suitable habitat above 8,500 feet. On the Navajo Nation, blue grouse has been recorded only in the Chuska Mountains. Structural vegetation diversity is a major determinant of habitat suitability for blue grouse. The species nests primarily in mixed conifer forests, especially those dominated by Douglas fir with varying amounts of aspen and possibly ponderosa pine. Winter habitat is almost exclusively montane conifer forests composed of fir or spruce and occasionally pinyon pine (Mikesic 2008). Although blue grouse are known for the Chuska Mountains, Tsaile Reservoir at approximately 7,000 feet is significantly below the species' elevational range in Arizona; therefore, blue grouse are not anticipated to occur in the project area.

Yellow warbler. Yellow warblers are riparian obligate breeders that generally nest in lower elevations, although they have been occasionally documented nesting above 7,000 feet (Wise-Gervais 2005). On the Navajo Nation the yellow warbler has not been documented breeding but potential habitat exists in Canyon de Chelly National Monument, along the San Juan River, and other areas (Mikesic 2008). Migration habitats include mainly semi-open scrub or shrublands and second-growth forests, often associated with wetlands. The project area lacks stands of potentially suitable riparian vegetation therefore yellow warbler are not anticipated to occur in the project area.

Southwestern willow flycatcher. The southwestern willow flycatcher was listed as endangered on February 27, 1995 (60 FR 10694), with critical habitat proposed on November 12, 2004 (69 FR 60705). This neotropical migratory species breeds in the southwestern United States from approximately early May to late August and migrates to Mexico, Central America, and possibly northern South America during the nonbreeding season (Sogge et al. 1997). The historical range of the southwestern willow flycatcher included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Unitt 1987). This species is a riparian obligate that nests near surface water or saturated soils in monotypic or mixed stands of native (e.g., willow, cottonwood, boxelder) or exotic (e.g., tamarisk or Russian olive) species, with or without an overstory. Vegetation is typically under 10-feet tall, dense with a closed canopy, although the understory may

be dispersed or clumped (Sogge et al. 1997). Nesting habitat varies in size and shape but usually does not include linear riparian zones under 30-feet wide. Although nesting has been recorded only along the Colorado and San Juan Rivers, breeding may occur at any elevation on the Navajo Nation where appropriate habitat exists (Mikesic 2008). The project area lacks stands of potentially suitable riparian vegetation; therefore, southwestern willow flycatchers are not anticipated to occur in the project area. No critical habitat has been designated within the project area; however, critical habitat for the flycatcher is currently under evaluation by the FWS and may or may not change as a result of this current review.

Peregrine falcon. Peregrine falcons breed in habitat consisting of steep, high cliffs (typically over 90-feet tall) in scrapes or on sheltered ledges. Foraging habitat quality is an important factor; often, but not always, water (lakes, rivers, or extensive wetlands) or forests are within the falcon's hunting range. Although peregrines are capable of killing birds the size of mallards and coots, resident birds probably rely mainly on smaller, more abundant passerine species. Jays, woodpeckers, swifts, and doves are among the commonly-taken prey species in Arizona and New Mexico. Breeding occurs across the Navajo Nation where appropriate habitat exists, including the Chuska Mountains, Canyon de Chelly National Monument, Black Mesa and north to Glen Canyon, the Dilkon-buttes region, and the canyon reaches of the San Juan, Colorado and Little Colorado Rivers (Mikesic 2008). During site visits it was determined that no suitable nesting habitat exists in the project area. The nearest concentration of nesting peregrine falcons is over 12 miles to the southeast in the Sonsela Buttes and Falling Iron Cliffs and 9 miles downstream in Canyon del Muerto. Although not proximate to nesting areas, Tsaile Reservoir does provide potential foraging habitat for peregrine falcons.

Bald eagle. Bald eagles in Arizona can be found nesting near rivers and lakes in the low desert up to higher elevation conifer forests. Nests are found in large trees and on cliffs and rock pinnacles. Foraging habitats in Arizona include both rivers and reservoirs. In riverine environments, eagles forage primarily on fish found in the relatively fast water of riffles (Glinski 1998). This habitat attracts spawning and foraging fish because of high oxygenation, clean substrate, and high invertebrate population levels. Dead and dying fish and/or waterfowl frequently provide forage in lentic conditions. There are presently 62 known breeding areas within the State (Kenneth Jacobson, Arizona Game and Fish Department, pers. comm.).

The bald eagle was down-listed from endangered to threatened on July 12, 1995. The bald eagle was delisted in July 2007, in the lower 48 states. Through court action the Sonoran Desert area remained listed until September 30, 2010, when the court lifted its injunction retaining the threatened status. The status of the eagles in the Sonoran Desert is currently delisted; however, this decision is currently being revisited in the courts. Eagles outside the Sonoran Desert and generally north of the Mogollon Rim have remained delisted since July 2007.

The Bald and Golden Eagle Protection Act (Act) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides for civil and criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle, ... alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb'' is further defined by regulation as: "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."

During certain breeding stages (incubation, young nestlings, and nestlings near fledging), human activity near a bald eagle nest can cause abandonment and/or failure (Anthony et al. 1994, Grubb and King 1991, Grubb et al. 2002, in Driscoll et al. 2006). Recreation affects bald eagle foraging as well. Breeding adults need foraging areas without constant human activity to capture prey successfully.

Bald eagle nesting near Tsaile Reservoir was discovered during the 2006 breeding season (Table 2). From 2006 through 2009 the pair successfully used the same nest (Nest 1). In 2010, the pair built and used a second nest (Nest 2) 770 meters farther from the reservoir within a stand of ponderosa pines. After the eagles arrived during the 2011 breeding season they initially investigated both nests prior to renesting in Nest 2.

Both nests are in areas that are appreciably higher in elevation than the project area. Nest 1 is partially visible from portions of project footprint and is about 680 meters away from the nearest edge of the project footprint. The current Nest 2 is farther from the project footprint at 1.43-kilometers and is not visible. During the 2007 breeding season a pair of nest watchers was stationed in the area observing Nest 1. The nest watchers observed the first signs of incubation on February 22, hatch was on April 1, and the fledge date was after May 6 (Stephens and Rainbolt 2007).

Table 2. Tsaile bald eagle nest summary.

Year	Nest Number	Status	Total Fledged
2006	1	Successful	2
2007	1	Successful	2
2008	1	Successful	2
2009	1	Successful	2
2010	2	Successful	2
2011	2	Successful	2

Tsaile Lake is typically frozen and not functioning as a food source from early December to late February or early March. During 2007, nest watchers observed the reservoir beginning to thaw in early March and it was fully thawed by March 16 (Stephens and Rainbolt 2007). On March 6-11, nest watchers noted other nonresident bald eagles using the reservoir. These additional eagles were not observed prior to March 6 or after

March 11; however, migratory eagles are known to use Tsaile Reservoir along with other lakes in the greater Tsaile area with regularity.

The bald eagle pair is known to use fish in Tsaile Reservoir and Gunnison's prairie dog colonies as their primary food source. Additional documented sources of food include Wheatfields Reservoir, Canyon del Muerto, road kill, and prey brought from other undocumented areas.

Although not representative of prey use at the current nest (Nest 2), the nest watchers in 2007 reported the observable prey composition at Nest 1 was: 83 percent fish, 4 percent birds, 1 percent mammals, and 12 percent was unknown. Eighty-three percent of the fish were either rainbow trout or channel catfish, with the remaining fish including, goldfish (8 fish, 10 percent), sunfish (3 fish, 4 percent), or other species (5 fish, 7 percent) (Stephens and Rainbolt 2007).

Despite the 2007 nest watcher observation points being within view of the small prairie dog colony at the reservoir, the nest watchers did not note the eagle use of the colony (Stephens and Rainbolt 2007). It is likely that under existing conditions the eagles primarily rely on other larger prairie dog colonies away from the reservoir which afford better hunting perches and have less human disturbance. Additionally, based on the size of the colony, it is anticipated that this colony is comprised of less than six individual prairie dogs and would have been depleted rapidly if it was a significant food resource for the eagles.

Based on observations of prey remains at in and around both nests it appears that composition of their diet also shifted with the move farther away from the reservoir to Nest 2. At Nest 2 the composition of prairie dogs in prey remains increased while the composition of fish decreased indicating a potential decrease in the importance of fish in the diet and an increase in prairie dogs to a significant percentage of diet (Kenneth Jacobson, Arizona Game and Fish Department, pers. comm.)[4]. Despite the decrease in fish among prey remains at Nest 2 fish remain an important resource for the Tsaile pair.

Nest watchers noted that the Tsaile eagles are very tolerant of high-human use of the area, and are rarely directly disturbed. During the 2007 season, out of the 612 human activity events at the reservoir there were only two times that an eagle left the area because of disturbance indicating that the pair does have a certain level of tolerance for a variety of human activities. Both times that an eagle was observed vacating a foraging perch resulted from a vehicle or a horseback rider headed directly for the eagle (Stephens and Rainbolt 2007).

[4] Due to prey remains from various species/taxa persisting in the environment for differing periods of time it is problematic to use this data to estimate percent composition of diet. However, assuming the available food sources did not change between nests it is somewhat possible to compare the relative change in abundance of prey remains from one nest to another.

On weekends, human activity was so dense at the reservoir that documenting the amount of recreational activity proved difficult for the nest watchers (Stephens and Rainbolt 2007). In 2007, human activity around Tsaile resulted in the eagles modifying their behavior by not standing, eating, or bathing on the shore in the immediate area where humans were present; however, they continued to use and forage at other areas of the reservoir while humans were present (Stephens and Rainbolt 2007). Although human activity does cause some behavior modifications by the eagles, these activities at existing levels predate the eagle's use of the reservoir indicating their acceptance to some level of human activity.

In addition to recreation, agriculture fields also occur throughout the Tsaile area including a farm field, farm equipment storage area, and residence that occur between the proposed construction footprint and both of the eagle nests. Standard farm practices occur in this area including the use of tractors and cultivation equipment in the field.

Black-footed ferret. The distribution and life history of the black-footed ferret is closely associated with large prairie dog communities (>80-hectares). Historically, there are only two known specimens of black-footed ferrets from Arizona, and the general impression is that this species was not common or abundant (Hoffmeister 1986). Currently, the Arizona Game and Fish Department (AGFD) and the FWS have attempted to introduce experimental populations of black-footed ferrets into the wild near Seligman, Arizona (~220 miles west of Tsaile). Natural populations of black-footed ferret probably became extirpated in Arizona about 1938. No critical habitat has been designated for this species in Arizona. The absence of sufficient sized prairie dog towns for the black-footed ferret in the action area precludes the possible occurrence of black-footed ferrets.

American band-tailed pigeon. Band-tailed pigeons are primarily summer residents of Arizona; however, during years where food resources are ample a few tend to remain in southeastern Arizona. Band-tailed pigeons prefer moister mixed conifer forests including those dominated by Douglas fir, white fir, and ponderosa pine. Of these forest types fewer reports occurred in pure ponderosa pine forests (Martin 2005). On the Navajo Nation band-tailed pigeons are known from the Chuska Mountains (Mikesic 2008). The nearest suitable habitat is about 500 meters away; however, this is monotypic ponderosa pine which is not the preferred habitat of mixed conifer and would likely only be used on a transitory basis.

Northern leopard frog. The northern leopard frog was listed on the Navajo Endangered Species List in 1997 as a result of negative surveys at historic sites in the Chuska Mountains. Geographically widespread declines or local extirpation of leopard frog populations have been noted in New Mexico and Arizona over the last several decades. Predation and competition by nonnative species (primarily crayfish, bullfrogs, and fishes), pollution, and random fluctuations in small populations are a few of numerous potential causes of these declines. Throughout its range, the northern leopard frog is found in permanent water bodies that support aquatic vegetation, including irrigation ditches, streams, rivers, ponds, lakes, wetlands, and wet meadows. On the Navajo Nation, the historic range included the Chuska Mountains; Little Colorado, Colorado and

San Juan Rivers; Navajo and Chinle Creeks; and areas near Tuba City, Cameron, Thoreau, and Newcomb. Most of these populations are now extirpated (Mikesic 2008). Northern leopard frogs are not known from within Canyon de Chelly National Monument (NPS 2005). Recent repeated surveys have not documented leopard frogs in Tsaile Creek or the reservoir (Chad Smith, NNDFW, pers. comm.).

Tree swallow. Tree swallows were traditionally considered a winter and migratory species in Arizona. In recent years tree swallows have begun to expand their breeding range further into Arizona (Corman 2005). Tree swallows typically nest near water at 6,100 and 9,400 feet in mixed conifer forests and montane conifer dominated drainages (Corman 2005). On the Navajo Nation, tree swallows are known from the Chuska Mountains (Mikesic 2008).

Goodding's onion. This species occurs within mixed conifer and spruce-fir forests in moist, shady canyon bottoms and north-facing slopes at elevations ranging from 6,400 to 11,250 feet; often along streams. Soils which support Goodding's onion are basaltic or rhyolithic with the upper horizon composed of loamy alluvium with a high organic content. In the Chuska Mountains, this species is also found in oak thickets interspersed with aspen, dogwood, and Douglas fir. Distribution on the Navajo Nation consists of the Chuska Mountains and Canyon de Chelly National Monument. Potential distribution includes the Chuska Mountains and Defiance Plateau on sites with suitable ecological and edaphic conditions (Mikesic 2008). There are no mixed conifer and spruce-fir forests in moist, shady canyon bottoms and north-facing slopes in the project in the project area. The project area does not have suitable ecological conditions to support this species.

Utah bladder-fern. Utah bladder-ferns grow at seeps, cracks, and ledges that occur on cliffs. They are known from cliffs above pools in upper canyons of Canyon de Chelly National Monument (Rink 2005).

Rhizome fleabane. The rhizome fleabane (also known as Zuni fleabane) was listed as threatened on April 26, 1985 (50 FR 16682). The species is found in pinyon-juniper woodland primarily in an elevation range of 7,600-7,700 feet, but populations range between 7,300 to 8,000 feet (Christe 2004). No populations exist below 7,300 feet (Christe 2004). It is often directly associated with Pinyon pine, oneseed juniper (*Juniperus monosperma*), Gambel oak, mountain mahogany (*Cercocarpus montanus*), and fourwing saltbush (*Atriplex canescens*). The species tends to be restricted to red or gray detrital clay soils derived from the Chinle Formation in the Zuni and Chuska Mountains and the Baca Formation in the Datil and Sawtooth Mountains, typically on erodible slopes with gradients of 15 to 45 percent. The rhizome fleabane grows only on north-, west-, or east-facing exposures in areas that receive 14 to 16 inches of precipitation a year. On the Navajo Nation, the species has been recorded in the Chuska Mountains near Lukachukai, Arizona, and west of Red Valley south to Navajo, New Mexico. Potential distribution occurs in pinyon-juniper associations between Lupton, Arizona, and Prewitt, New Mexico (Mikesic 2008). A 2004 survey of potential habitat in the greater Tsaile-Wheatfields area documented several populations; however, all of these occurred over 7,600 feet (Christe 2004).

Navajo bladderpod. The Navajo bladderpod is a perennial low growing plant forming cushion shaped clumps. This species is found on windward, windswept mesa rims with sparse vegetation (Mikesic 2008). Bases and slopes of small hills of the Chinle formation or where Todilto Limestone is overlaying Entrada Sandstone or Chinle outcrops are considered suitable habitat. Navajo bladderpod is known in Arizona from the Red Valley area to Wheatfields Lake (Mikesic 2008).

Navajo Sedge. The Navajo Sedge is a perennial grass-like plant with narrow leaves that is known from northern Arizona and San Juan County, Utah. Within the Navajo Nation it occurs from Navajo Creek drainage in Coconino County, east to the Tsegi Canyon Watershed in Navajo County and is known from Canyon De Chelly National Monument. Navajo sedge occurs in hanging gardens on vertical sandstone alcoves and cliffs.

Rocky Mountain elk, wild turkey, mule deer, and black bear. Wildlife that have cultural and/or economic significance to the Navajo Nation, such as Rocky Mountain elk, wild turkey, mule deer, and black bear, likely use the project area to a limited extent. These species are known to occur in the greater Tsaile area.

3.4.8 Environmental Consequences – Special Status Species

No Action

Existing habitat conditions and special status species communities would persist into the foreseeable future unless SOD concerns require additional lowering of reservoir levels. Substantial additional drawdown of the reservoir due to embankment instability could result in continued decline of water resources in the reservoir and would impact special status species that utilize the reservoir as a resource. Temporary and permanent construction impacts from ground disturbance would not occur.

Alternative A (Preferred Action)

Sora. The project area does not support suitable habitat for the sora. Within the project limits there is no emergent vegetation suitable for use by the sora. Downstream of the project area in Tsaile Creek there is a small patch of emergent vegetation that is about 200 meters outside the construction footprint for the dam. This patch would not be impacted by construction and would be protected in place. No adverse impacts to sora are anticipated.

Mexican spotted owl. The project area does not contain suitable roosting or nesting habitat for the Mexican spotted owl. This species has not been recorded in the project area, although stands of pinyon-juniper habitat and ponderosa pine in adjacent areas potentially could be used by winter transients for foraging. Loss of approximately 0.8 acres of pinyon-juniper would not be expected to affect winter foraging due to the abundance of similar habitat in surrounding areas. The nearest known Mexican spotted owls are approximately 3 miles downstream. No effect to the Mexican spotted owl is anticipated.

Western seep fritillary. The area downstream of Tsaile Dam has the potential for marginally suitable western seep fritillary habitat to exist. Within the project area, however, the damp margins of Tsaile Creek are highly disturbed and devoid of suitable host plants. According to NPS (2005), habitat for the western seep fritillary does not exist in the Canyon de Chelly National Monument. Additionally, the project's footprint only includes disturbance in the area immediately below the dam. No adverse impacts to the western seep fritillary are anticipated because of the negligible amount of disturbance to marginally suitable habitat and low potential for western seep fritillary use.

Golden Eagle. No golden eagle nests occur adjacent to Tsaile Reservoir. Golden eagles nesting in Canyon de Chelly would primarily forage in the more expansive open area adjacent to the lower and deeper canyon because of its closer proximity to suitable nesting habitat. The abundance of foraging habitat closer to known nests would preclude any impact from the minor temporary loss of foraging habitat or from any temporary construction related disturbance. No adverse impacts to the golden eagle are anticipated. Furthermore, the project would not result in direct take of an eagle; or would not result in disturbance of an eagle to the extent that it would agitate or bother to a degree that causes, or is likely to cause, injury, a decrease in productivity, or nest abandonment in violation of the Bald and Golden Eagle Protection Act.

Clark's grebe. Clark's grebes have not been documented on Tsaile Reservoir; however, the open water provides potential foraging habitat. Due to a lack of submerged or emergent vegetation bordering Tsaile Reservoir there is no suitable nesting habitat. The project has a potential to temporarily impact Clark's grebes by reducing the potential foraging habitat through drawdown of the reservoir and through noise associated with construction. Since there is no recorded use of Tsaile Reservoir by Clark's grebe it is anticipated that these potential impacts would be nonexistent to negligible.

Northern saw-whet owl. Northern saw-whet owls have not been documented at Tsaile Reservoir and no habitat exists within the project footprint. Potential habitat in the form of ponderosa pine forest exists adjacent (~500-meters from edge of footprint) to the project; however, pure ponderosa pine forests are not their preferred habitat. At the lower end of their elevational range, as Tsaile Reservoir is, the northern saw-whet owl tends to prefer cool forested canyons which do not exist in the project area. No impacts to northern saw-whet owls are anticipated.

Bluehead sucker. Isolated bluehead suckers occur in Tsaile Creek below the dam. It is anticipated that these bluehead suckers would be able to persist in the creek throughout the project because flows downstream of the dam would remain through construction and refilling. No impacts to bluehead sucker are anticipated.

Peregrine falcon. The project area lacks suitable nesting areas for the peregrine falcon. Peregrine falcons may occasionally use the project area for foraging although there is a lack of cliffs or rock pinnacles in the project area. A substantial reduction in water storage during construction would decrease the amount of aquatic birds in the immediate vicinity of Tsaile Reservoir. While this reduction in aquatic birds may occur, due to the lack of nests proximate to the reservoir, there likely is at most only occasional peregrine use of Tsaile. The abundance of other waters in the greater Tsaile area would mitigate the impact of a dewatered reservoir. In Arizona, aquatic birds are not the peregrine's preferred prey. Additionally, peregrine falcons nesting in Canyon del Muerto primarily forage within the canyon because abundance of resources that it contains (Chad Smith, NNDFW, pers. comm.). No impacts to peregrine falcons are anticipated because of the likely seldom use of Tsaile Reservoir and the abundance of other food resources in the area.

Bald eagle. Bald eagles nest in the vicinity of Tsaile Reservoir and use the reservoir as a food source in combination with other food resources in the area. Bald eagles are also accustomed to frequent human activity in the form of recreation, residences, and farming occurring in the project area.

The FWS National Bald Eagle Management Guidelines (Guidelines) set recommended minimum distances for categories of activities. These guidelines provide two categories of activity intensity: Category A (less disruptive activities) and Category B (more disruptive activities). The project is anticipated to produce disturbance closest to Category A, which includes activities such as alteration of shorelines, water impoundments, construction of roads, etc. Under the proposed project, the use of standard construction equipment such as scrapers, bulldozers, excavators, and dump trucks is more consistent with Category A. Category B includes more disruptive activities such as mining, oil and gas drilling, etc. During the breeding season the project would not use the more disruptive construction activities/equipment like blasting or rock crushing which are common with Category B activities.

The Guidelines set minimum distances of construction to the nest depending on the type of activity, the occurrence of other similar activities in the area, and the visibility of the activity from the nest. Minimum distances range from 660 feet (Category B activities with no similar activities within 1 mile of the nest, where the activity would be visible from the nest) to a low of 330 feet (Category A activities with similar activities within 1 mile of nest, where the activity would not be visible from the nest).

The edge of the Tsaile project footprint would be 4,700 feet from the active nest (Nest 2) and 2,220 feet from the alternate nest (Nest 1). Consequently, the project would provide at minimum over three times the maximum buffer specified in the Guidelines even if the eagles return to Nest 1.

In 2008, the Navajo Nation enacted the Navajo Nation Golden and Bald Eagle Nest Protection Regulations (Regulations). These Regulations are similar in style to the FWS National Bald Eagle Management Guidelines, but are more restrictive while still offering flexibility of modification on a case-by-case basis by the NNDFW. The Regulations define level of activities as brief, light, heavy, or loud. Brief activities are activities that persist for up to 1 hour per day and involve only personnel and passenger or maintenance vehicles. Light activities are activities that persist for up to 1 day in the same general area and involve up to 5 vehicles (including 3 construction vehicles) and 10 personnel. Heavy activities are activities that exceed light activities and include actions such as road construction. Loud activities exceed the normal base-level of construction noise and include activities that would not occur on the proposed project during the breeding season such as blasting or rock crushers.

The Regulations set minimum distances between February 1 and July 15 for each type of activity. Light activities are permissible at a distance greater than 800 meters from the nest. Heavy activities are permissible at a distance greater than 1 kilometer from the nest. Loud activities are permissible at a distance greater than 1.2 kilometers from the nest.

The edge of the project footprint would be 1.43 kilometers from the active nest (Nest 2), or 0.43 kilometers beyond the restrictive buffer established under the Regulations for heavy activities. Vegetation consisting of ponderosa pine occupies approximately 59 percent (0.85 kilometers) of this distance. This vegetation would attenuate sound emitted by construction equipment and provide a visual barrier. Consequently, no impact from construction noise or activity is anticipated if the eagles continue to use Nest 2.

Approximately 0.68 kilometers separate Nest 1 from edge of the construction area (borrow area). Construction activities within 1 kilometer of Nest 1 would consist entirely of standard borrow area activities involving the use of bulldozers, excavators, or scrapers. If the eagles return to Nest 1, it is possible that construction may have little direct effect due to the habituation of the eagles to human activities at the reservoir, which include recreation and mechanized farming. Additionally, the distance from Nest 1 to the edge of construction (2,220 feet; 0.68 kilometer) is over three times the 660-foot maximum buffer specified in the Guidelines, but would be within the 1 kilometer specified by the Regulations. Although construction related activities may be of a similar nature to the

existing farm tractor use, which is more proximate to the nest, it is possible that the Tsaile eagles will have a different level of tolerance for these activities. In the event that the eagles return to Nest 1, construction activities would be sequenced to avoid areas within the 1-kilometer buffer between February 1 and July 15.

If blasting is required for the project it would only be conducted outside the nesting season of February 1 and July 15, unless NNDFW and FWS, in advance, determine that the proposed blasting could occur without impact to the eagles.

In addition to the noise and activity associated with construction, food resources at Tsaile Reservoir would decrease during construction. The drawdown of the reservoir would reduce foraging opportunities for the Tsaile pair until construction is complete and the reservoir is refilled and restocked. Depending on the exact time of drawdown it is anticipated that during the early 2012 season the Tsaile pair may have additional foraging opportunities at Tsaile Reservoir as the existing fish populations become more concentrated during drawdown.

Although there is no documentation of the eagles using the one small prairie dog colony in the project footprint, this potential food resource would be impacted as a result of borrow activity. However, based on the size of this resource (<6 prairie dogs) it is not capable of providing a significant or sustained food resource for eagles.

Based on observations of the Tsaile pair foraging at Wheatfields (approximately 8 miles from Tsaile) it is assumed that the Tsaile eagles are capable of foraging within an 8-mile radius of Tsaile Reservoir. Within this radius, there are approximately 90 perennial or intermittent water bodies of varying sizes from a fraction of an acre to over 280 acres. Most of these water bodies have adjacent perch sites due to the general forested nature of the area. While the vast majority of these water bodies are not stocked and likely do not contain significant numbers of fish they would provide other foraging resources including waterfowl for the Tsaile pair. Although the Tsaile eagles have foraged at Wheatfields, this increased distance likely precludes its use as the exclusive food resource for the Tsaile eagles during nesting. Tsaile Reservoir provides a significant resource in close proximity to the nest. Foraging at other water bodies will likely consume more time and energy because of distance and the limited resources that would occur at any one individual small water body.

The proposed project would follow an adaptive management protocol to manage actual and potential project/non-project related impacts to the bald eagles whether or not those impacts would result in take under the Bald and Golden Eagle Protection Act. This protocol would occur in a phased approach, and protection measures would increase depending on the monitored potential threat to the eagles. This adaptive management protocol would address the two primary potential causes for interference with the eagles, direct disturbance and a loss of a food resource. Not only would this protocol allow resource managers to reduce the potential for construction related impacts, it would also provide additional protection against non-construction related impacts including recreation related impacts.

In conjunction with the drawdown of Tsaile, NNDFW would begin a temporary stocking program at alternate foraging areas for the eagles. This stocking program would begin as the reservoir is drawn down and would continue until the reservoir is refilled after construction. The temporary stocking program would be a two phased approach. The first phase would include translocation of a portion of the sport fish (trout and catfish) from Tsaile to the alternate foraging resources. The second phase of stocking would occur each spring as the ice begins to melt when these alternate foraging resources would be restocked to replenish any depletion of fish that occurred overwinter.

This temporary stocking program would add fish to an unnamed lake approximately 1 kilometer east-northeast of Tsaile Reservoir and a large pond approximately 300 meters from Nest 2. Both of these supplemental resources have a surface area of between 2 and 3 acres. In addition to stocking these two locations, fish may also be opportunistically stocked in other water bodies within the greater Tsaile area. Given the proximity of these water bodies to the Tsaile nest, their proximity to common foraging areas, and the availability of numerous perches at these resources, it is likely that the eagles would adapt to these new food sources.

It is anticipated that other existing food resources (prairie dogs, etc.) in conjunction with the fish stocking efforts would at least in part offset the temporary reduction of foraging resources at Tsaile Reservoir during the three breeding seasons it is drawn down or partially drawn down for construction and refilling. It is also anticipated that there would be additional benefits associated with the fish stocking. Among these additional benefits are multiple new food sources that have significantly less human recreational disturbance and have more abundant hunting perches at their margins.

Periodic site visits to Tsaile Reservoir would be conducted prior to the eagles nesting each year in order to monitor the date of arrival, their status, the use of food resources, and to document any potential construction related impacts. Corrective action would be taken in consultation with NNDFW and FWS if these visits document construction related impacts.

If the eagles return to nesting in Nest 1, then construction within 1 kilometer of Nest 1 would cease until the nest fledges, fails, or if NNDFW and FWS determine that this buffer is no longer needed. In effect this would result in temporarily cessation of operations at the borrow area. Other construction activities would be outside the buffer and would not be affected. It is assumed that if this buffer around Nest 1 is established other non-construction related activities including farming and recreation would continue within this buffer as these are not within control of the project.

Nest watchers trained and staffed by NNDFW, or at NNDFW discretion nest watchers trained and staffed by AGFD, would monitor the Tsaile pair each nesting season during drawdown, construction, and refilling. The nest watchers would arrive onsite at a date to be set each year by NNDFW and FWS based on past and anticipated site conditions.

Nest watchers would monitor the bald eagles for actual and potential impacts associated with the project and for other potential impacts not associated with construction including those associated with recreation, agriculture, or fishing line entanglement. If the nest watchers document impacts to the eagles, corrective action would be taken in consultation with NNDFW and FWS. At the discretion of NNDFW, this corrective action may also involve assistance by AGFD. Nest watchers as part of their normal activities would be able to educate recreational users about bald eagles thereby helping over the long term to reduce public impacts to the eagles.

Part of the nest watchers activities would include monitoring of the eagles to determine if they are encountering problems as a result of lack of food resources. Nest watchers typically are able to determine by behavior if problems are being caused by a lack of food resources, providing sufficient time to allow for supplemental feeding if needed (Kenneth Jacobson, AGFD, pers. comm.). Nestwatchers would compare behavior with typical behavior of southwest bald eagles and with the previously documented behavior of the Tsaile pair. During incubation the nestwatchers would look for extended periods between nest exchanges or the total amount of time that the nest is left unattended. Both of these are signs that the adults are spending extended periods foraging for food. During nestling stage, the nestwatchers would look for nest absences, extended time between feedings, and reduced prey deliveries. These are standard techniques that are regularly used by nestwatchers to document lack of food resources. Most recently, in 2011 these techniques documented the Ladders breeding area suffering from a lack of food which resulted in one nestling dying and the second nestling struggling prior to fledging, as supplemental feeding was not part of this effort (Kenneth Jacobson, AGFD, pers. comm.).

If the nest watchers document impacts to the eagles from a lack of food resources, then at the discretion of NNDFW and FWS, a program of supplemental feeding would begin. Eagles tend to readily accept and consume food that is provided for supplemental feeding (Knight and Anderson 1990; McCollough et al. 1994). Based on the documentation of the Tsaile pair consuming carcasses from road kills it is anticipated that they would readily adapt to a supplemental feeding program. The supplemental feeding program if needed is anticipated to be carried out by the nestwatchers that are onsite. The nestwatchers would have access to a freezer kept in the local area which would be stocked with fish. This would be the source of supplemental food for the eagles. The nestwatchers would regularly place fish at an area away from human activity where the eagles routinely forage. If after discussions with NNDFW and FWS it is determined that the supplemental feeding program is no longer needed it would cease for the remainder of the year and will be reevaluated the following year.

As mentioned above, it is anticipated that other existing food resources (prairie dogs, other waterbodies, etc.) in conjunction with the fish translocation efforts would work to offset the temporary loss of foraging at Tsaile Reservoir while it is drawn down for construction. It is not anticipated that there would be appreciable direct construction related disturbance at the nest, given that the eagles are accustomed to a variety of human activities and that Nest 2 is significantly beyond both the FWS guidance and the Navajo

Nation Regulations for nest disturbance. Additionally, if the eagles return to Nest 1 then a construction buffer would be established in compliance with the Navajo Nation Regulations.

Based on compliance with the FWS Guidelines and Navajo Nation Regulations regarding eagle disturbance; the tolerance of the Tsaile pair; and the aforementioned adaptive management program including supplemental feeding, it is not reasonably anticipated that the project would result in direct take of an eagle, or would result in disturbance of an eagle to the extent that it would agitate or bother to a degree that causes, or is likely to cause, injury, a decrease in productivity, or nest abandonment in violation of the Bald and Golden Eagle Protection Act.

On the other hand, based on the eagles' use of Tsaile, dewatering the reservoir and the extent of construction it is reasonable to assume that the project would impact the bald eagle. The reduced food resources in Tsaile Reservoir during construction may result in changes in time and energy spent foraging; however, if a lack of food resources becomes a problem then the adaptive management program would require supplemental feeding to help offset the loss of this resource.

It is believed that the adaptive management program, by providing nestwatchers, would further protect the eagles from non-construction related impacts that they normally would not be protected from. Despite these measures, the project intends to provide further assurances by applying for a Bald and Golden Protection Act Permit and any authorization required by the Navajo Nation.

American band-tailed pigeon. The project footprint does not contain suitable habitat for the band-tailed pigeon. The nearest suitable habitat is about 500 meters away; however, this is monotypic ponderosa pine which is not the preferred habitat of mixed conifer. Substantial stands of more suitable mixed conifer exist outside the project area at higher elevations in the Chuska Mountains. No impact to the American band-tailed pigeon is anticipated.

Northern leopard frog. Tsaile Reservoir lacks the habitat heterogeneity that is necessary to sustain viable leopard frog populations. Fluctuating water levels have created expansive banks that are devoid of cover. The absence of shallow water with emergent vegetation – a key element for leopard frog breeding – combined with abundant predatory trout, catfish, and crayfish precludes the possible occurrence of this species in the reservoir. Tsaile Creek downstream of Tsaile Dam does have vegetated margins, but it is dominated by nonnative fish and crayfish likely precluding anything more than transient leopard frog populations as repeated surveys have not documented leopard frogs. Additionally, flows in Tsaile Creek below the dam during construction would remain perennial. After construction, seepage from the toe drain system would be sufficient to support continuous base flow in the creek. No impact to the northern leopard frog is anticipated.

Tree swallow. The project footprint does not contain suitable nesting habitat for tree swallows. The nearest suitable nesting habitat consists of a stand of ponderosa pine approximately 500 meters away; however, this habitat would not be impacted by the project. The drawdown of Tsaile Reservoir during construction would result in a minor reduction of foraging habitat. Temporary loss of this foraging habitat would not adversely impact tree swallows due to the abundance of similar foraging habitat in the greater Tsaile area.

Utah bladder-fern. There are no seeps, cracks, and ledges that occur on cliffs in the project area. In upper canyons of Canyon de Chelly National Monument, Utah bladder-fern are known from cliffs above pools; however, there are no cliffs above pools within the project area. There is one seep below the dam that is at the base of a small rock ledge. This seep and the associated wetland would be protected and fenced off prior to construction. No impact to the Utah bladder-fern is anticipated.

Rhizome fleabane. The elevation of the project area is below 7,045 feet, which is below the elevation (7,300 feet) at which the lowest population is known to exist. Christe (2004) surveyed suitable habitat and documented all populations in the greater Tsaile area as occurring above 7,600 feet. From Tsaile Dam it is approximately 1.5 miles to the nearest areas where the elevation is above 7,300 feet, and over 2.1 miles to an area above 7,600 feet. Further, as part of this project only 0.8 acres of pinyon-juniper habitat would be impacted. No effect to the rhizome fleabane is anticipated.

Navajo bladderpod. Although the Chinle formation does occur in the project area, generally the project limits do not consist of windward or windswept mesa rims with the possible exception of the dam itself. The prism of the dam is highly disturbed and likely does not support Navajo bladderpod. No impact to the Navajo bladderpod is anticipated.

Navajo Sedge. There are no hanging gardens associated with the seep immediately downstream of Tsaile Dam. Additionally, as described above, the seep would be fenced off during construction and protected in place. Roth in 2004 surveyed suitable habitat for the Navajo Sedge with an emphasis on Arizona populations (Roth 2004). Based on an analysis of the Roth data and other data housed by Navajo Nation Heritage Program and the NPS, the Navajo sedge has not been documented in the project area and this seep does not appear to be suitable habitat for the Navajo sedge (Andrea Hazelton, NNHP, pers. comm.; Michelle Dela Cruz, NPS, pers. comm.). No effect to the Navajo sedge is anticipated.

Rocky Mountain elk, wild turkey, mule deer, and black bear. It is anticipated that construction would cause temporary displacement of these highly mobile species. Although this project would likely reduce their use of Tsaile Reservoir, there is a significant number of other perennial or intermittent water sources within the range of these species. Impacts associated with animal avoidance of Tsaile Reservoir during construction are anticipated; however, these impacts would be localized and temporary.

3.5 CULTURAL RESOURCES

3.5.1 Affected Environment

The region encompassing Canyon de Chelly National Monument is rich in prehistoric Anasazi or Ancestral Puebloan sites as well as historic Navajo sites. Downstream of Tsaile Dam, the national monument contains more than 750 officially recorded archaeological sites and over 2000 other culturally significant sites (NPS 2005). Typical cultural resources in the area include petroglyph and pictograph sites, agricultural sites, resource procurement and processing sites, and a variety of habitation sites, located in caves and overhangs in walls of the canyons and in the canyon bottoms and on the mesa tops, and include small single- and multiple-room masonry surface structures and larger masonry pueblos. Historic Navajo and structures and features are also found in the canyons and along the mesas tops. Several areas within the monument are traditionally important to the Navajo.

Historic stream bank erosion caused by various natural and anthropogenic events has threatened archaeological sites, burials, and agricultural fields along the floor of Canyon del Muerto and other canyons in the national monument. As early as the 1930s, efforts to control stream bank erosion have been successfully implemented near several key archaeological sites. However, land erosion continues to threaten many cultural resource sites.

Between 2003 and 2010, Reclamation completed four Class III (intensive) cultural resource surveys encompassing approximately 90 acres. The Class III surveys included the construction impact areas shown on Figure 2. Site maps and records at the Navajo Nation Historic Preservation Department (NNHPD) were checked prior to the surveys. No cultural resources were recorded in the area of potential effect, and a NNHPD official indicated that Traditional Cultural Properties were not a concern in the project area. No significant cultural resources and only a couple of isolated lithic flakes were identified by the four surveys.

3.5.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct effect to cultural resources since no project would be constructed or implemented.

Alternative A (Preferred Action

Under the Preferred Action, there would be no direct impact to significant cultural resources. The NNHPD concurred with Reclamation's no effect determination for activities associated with construction. No areas of traditional cultural importance or areas of specific tribal concern have been identified in the area of potential effect.

Water releases from Tsaile Reservoir during dewatering operations would be monitored and adaptively controlled to ensure that they do not contribute to stream bank erosion or other changes in channel morphology that have the potential to affect cultural resources. Reclamation would work collaboratively with NPS staff to ensure dewatering operations do not caused conditions that could adversely affect cultural resources. Consequently, no effect to cultural resources in Canyon del Muerto is anticipated.

Alternative B

The cultural resource effects would be the same as those described for the Preferred Action.

Cumulative Effects

There would no cumulative effect to cultural resources.

3.6 AIR QUALITY

3.6.1 Affected Environment

Air quality is determined by the ambient concentrations of pollutants that are known to have detrimental effects on public health and the environment. In accordance with Section 109 of the Clean Air Act (CAA), the U.S. Environmental Protection Agency has promulgated National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), ozone, sulfur dioxide, and lead. Areas with air quality that do not meet the standards are designated as "nonattainment areas." Designation of nonattainment submits an area to regulatory control of pollutant emissions so that attainment of the NAAQS can be achieved within a designated time period. Apache County is designated unclassifiable (attainment) for all criteria pollutants (http://www.epa.gov/region9/air/maps/index.html).

The CAA provides special protection for visibility and other air quality related values in specially designated Class 1 areas where the cleanest and most stringent protection from air quality degradation is considered important. These areas include National Parks and Wilderness Areas which have been specifically designated Class 1 under Section 162(a) of the CAA. Class 1 designation allows almost no degradation in air quality. Petrified Forest National Park is the only Class I area in Apache County. All other areas of the county are designated Class II, including Canyon de Chelly National Monument. Although the CAA does not provide strict protection of Class II areas that it affords Class I areas, NPS guidance recommends minimization of adverse air quality impacts when actions are implemented within national park units with Class II status.

Executive Order (EO) 13514 directs Federal agencies to promote pollution prevention and reduce emissions of greenhouse gases (GHG)[5] that result from their actions. The CEQ has proposed an annual reference threshold of 25,000 metric tons of carbon dioxide (CO_2)-equivalent GHG emissions as a useful indicator for agencies to consider when analyzing potential action-specific GHG emissions in NEPA documents (CEQ 2010). This threshold was considered relevant by CEQ because it is a minimum standard for reporting GHG emissions from specified industries under the CAA (EPA's Mandatory Reporting of Greenhouse Gasses Final Rule, 74 FR 56260). Local sources of CO_2-equivalent GHGs include combustion emissions from vehicles and home heating.

The project area lies at an approximate elevation of 7,000 feet and is representative of climates typically associated with high desert. Rainfall on the Defiance Plateau near the western slope of the Chuska Mountains averages 15 to 18 inches annually. On a regional scale, periodic high winds contribute to temporary increases in the levels of atmospheric dust. Localized dust emissions are generated by vehicle operations on unpaved roads. Agricultural fields northeast of the project area are a minor source of fugitive dust. Air quality in the project area is considered good.

3.6.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct effect to air quality because no project would be implemented. No changes in land use are expected in the project area that would contribute to long-term changes in air quality.

Alternative A (Preferred Action)

During construction, sources of air pollution include increased air-borne particulate matter from ground disturbances and tailpipe emissions from equipment. Tailpipe emissions would persist only during equipment operation. Primary sources of fugitive dust would include earth moving associated with construction of the stability berm and fill material extraction and stockpiling. Increases in road dust would also be generated by construction traffic using unpaved public roads and haul roads. Soils that are destabilized by ground-disturbing activities would likely become a passive source of wind-blown dust until stabilization efforts can be implemented. No long-term adverse impact to air quality would result. The operation of construction equipment would generate minor amounts of engine combustion products such as nitrogen and nitrous oxides, CO_2, carbon dioxide, and reactive organic gases. These emissions would not produce measurable changes in ambient concentrations of regulated pollutants or result in a change in attainment status for the air quality region. Direct emission of CO_2-equivalent GHGs from the proposed project would be substantially below the level considered by CEQ to be relevant in a NEPA evaluation.

[5] CEQ defines GHGs, in accordance with Executive Order 13514, as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Alternative B

The air quality effects would be similar to those described for the Preferred Action, except emissions would persist approximately 9 months longer. Additional fugitive dust emissions would likely result from excavation and removal of the outlet works and from stockpiling greater volumes earthen material.

Cumulative Effects

Particulate and gaseous exhaust emissions (including GHGs) from the proposed project would be cumulative to pollutants emitted from other natural and anthropogenic events into the atmosphere. The small quantities of pollutants released during construction would have a negligible, short-term cumulative effect on local air quality or global processes that lead to climate change. There would be no direct, indirect, or cumulative effect on Class 1 airsheds or nonattainment areas.

3.7 HAZARDOUS MATERIAL AND SOLID WASTE

3.7.1 Affected Environment

No sites contaminated with hazardous or non-hazardous solid wastes are known to occur within the area potentially affected by construction (http://www.epa.gov/enviro). Use, storage, and disposal of hazardous materials and solid waste associated with construction have the potential to adversely affect the environment if these materials are improperly managed. In general, most potential impacts are associated with the release of these materials to the environment. Direct impacts of such releases would include contamination of soil, water, and vegetation, which could result in indirect impacts to wildlife, aquatic life, and humans.

3.7.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact regarding use of hazardous materials, since no project would be constructed or implemented. Existing conditions would prevail in the project area.

Alernative A (Preferred Action)

The proposed project would require the short-term use of limited quantities of fuels, lubricants, and other fluids that would be used to power and operate equipment during construction. Chemical toilets also would be present at the worksite. Hazardous materials and other chemical media associated with these uses would be managed in accordance with Federal and tribal regulations. Spills of hazardous material would require immediate corrective action and cleanup to minimize any potential adverse effect on sensitive resources.

Construction would require the short-term use of fuels, lubricants, and other fluids that create a potential contamination hazard. These and other hazardous substances would be stored and handled in accordance with Federal and tribal regulations. Any spills or leaks of hazardous material would require immediate corrective action and cleanup to minimize the impact on sensitive resources.

If on-site storage of lubricants and fuels occurs, these materials would be placed in temporary, clearly marked, above-ground containers which would be provided with secondary containment. Construction equipment would be maintained and inspected regularly. Any soil contaminated by fuel or oil would be removed and transported to an approved disposal site.

Hazardous materials and other hazardous substances that are used in construction would be disposed of in accordance with applicable laws and regulations. Excess or unused quantities of hazardous materials would be removed upon project completion. Although hazardous waste[6] generation is not anticipated, any such wastes produced during construction would be properly containerized, labeled, and transported to an approved hazardous waste disposal facility. All nonhazardous waste materials including construction refuse, garbage, sanitary waste, and concrete would be removed from the work area and transported to an approved disposal facility.

Alternative B

Under Alternative B, the potential impacts that may result from use of hazardous material are similar to those described for the Preferred Alternative.

Cumulative Effects

Appropriate hazardous material management and waste disposal would obviate any cumulative effect on the environment.

3.8 INDIAN TRUST ASSETS

3.8.1 Affected Environment

Indian trust assets are legal interests in property held in trust by the United States through the Department of the Interior for federally recognized Indian tribes or individual tribal members. Examples of things that may be trust assets are lands, mineral rights, hunting, fishing, or traditional gathering rights and water rights. The United States, including all of its bureaus and agencies, has a fiduciary responsibility to protect and maintain rights reserved by or granted to Indian tribes or individual tribal members by treaties, statutes, and Executive Orders. This trust responsibility requires that all Federal agencies, including Reclamation, ensure their actions protect trust assets. Secretarial Order 3175 (incorporated into the Departmental Manual at 512 DM 2) requires that the potential

[6] Hazardous waste is defined in 40 CFR 261.

impacts of DOI bureau actions on Indian trust assets, and tribal health and safety, must be addressed in planning and decision documents, such as this EA. The DOI bureau must also consult with the appropriate level of tribal government whose trust assets are potentially affected or when tribal health and safety are at risk.

Trust assets of the Navajo Nation that would be affected by the proposed project include land and surface water resources. Reclamation, in cooperation with the BIA and the NNDWR SOD Program, coordinated with several Navajo Nation governmental departments, including the Land Department.

3.8.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct impact to Indian trust assets because no project would be implemented. Current SOD operating restrictions would remain in effect into the foreseeable future, limiting the storage capability of the reservoir. There would no construction-related restrictions on use of the land in the project area

Alternative A (Preferred Action)

Ground disturbances resulting from construction and contractor use would affect approximately 11.5 acres of land at the dam, spillway, staging area, and borrow areas. Access to tribal land within active work areas would be controlled during construction to protect public safety and welfare.

Construction activities would exercise care to preserve the natural landscape and land use values. Except where earthmoving is required for temporary and permanent structures, approved staging/stockpiling areas, and borrow activity, all trees, shrubbery, and other vegetation would be protected from damage. On completion of work, all work areas would be left in a condition to provide for proper drainage, prevent erosion, and facilitate revegetation. Impacts to land within the project area would be reduced through implementation of site stabilization and erosion control best management practices where practicable.

Following construction, there would be a greater supply of stored water for fish and wildlife and potential future irrigation releases to downstream water users.

Correction of safety deficiencies would obviate the risk to land and water resources from catastrophic failure of Tsaile Dam.

Alternative B

Under Alternative B, the effects to trust assets would be similar to those described under the Preferred Action.

Cumulative Effects

The cumulative effect of the project would be to increase the trust asset value associated with improved conditions for water storage.

3.9 ENVIRONMENTAL JUSTICE AND SOCIOECONOMIC CONSIDERATIONS

3.9.1 Affected Environment

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was issued by the President of the United States on February 11, 1994. This order established requirements to address Environmental Justice concerns within the context of agency operations. As part of the NEPA process, agencies are required to identify and address disproportionately high and adverse human health or environmental effects on minority or low-income communities. Federal agencies are directed to ensure that Federal programs or activities do not result, either directly or indirectly, in discrimination on the basis of race, color, or national origin. The order also requires that "the responsibilities set forth shall apply equally to Native American programs."

Data obtained by the U.S. Census Bureau from the 2005-2009 American Community Survey (ACS) indicate that minority populations comprised primarily of American Indians represent a majority of the total population in the project area and Apache County (Table 3). The American Indian populations in Census Tract (CT) 9441 (96.5 percent), CT 9442 (95.0 percent), and Apache County (74.9 percent) were significantly higher than the percentage for the State of Arizona (4.6 percent). For the purpose of this EA, the American Indian residents of the Tsaile (CT 9441) and Chinle/Canyon del Muerto (CT 9442) areas constitute the only protected populations in the project area.

Data from the ACS indicate that per capita and median household incomes were substantially lower, and poverty levels were substantially higher, in the two census tracts than the State of Arizona. In the Chinle/Canyon del Muerto area, a slight majority of individuals (50.4 percent) live below the poverty level. These data are indicative of the economic challenges facing Navajo residents of the Tsaile and Chinle areas.

Table 3. Income and poverty statistics.

Socioeconomic Attribute	CT 9441 (Tsaile Area)	CT 9442 (Chinle/Canyon del Muerto Area)	Apache County	Arizona
Population	4,940	7,156	68,318	6,204,965
American Indian	96.5%	95.0%	74.9%	4.6%
Median Household Income	$23,198	$20,132	$28,387	$50,296
Per Capita Income	$ 7,453	$10,167	$11,614	$25,203
Persons Below Poverty	47.7%	50.4%	36.8%	14.7%
Families Below Poverty	51.4%	35.5%	28.5%	10.5%

Source: U.S. Census Bureau, 2005-2009 American Community Survey.

3.9.2 Environmental Consequences

No Action

Under the no action alternative, there would be no direct effect to low-income or minority populations because no project would be implemented. Any additional loss of reservoir storage due to enhanced operating restrictions could further reduce the economic benefit associated with lake-based recreation. This would have a greater socioeconomic impact on the population in the Tsaile area (CT 9441) than any other area.

Further drawdown of the reservoir also would negate future opportunities for viable irrigation releases from Tsaile Dam, potentially affecting the Canyon del Muerto component of the CT 9442 population.

Alternative A (Preferred Action)

Under the Preferred Action, there would be a minor, short-term economic benefit for local businesses that result from construction workers' expenditures on lodging and food. Most of the non-resident work force would likely commute from lodging venues in Chinle. In addition, there may be temporary construction-related employment opportunities for local residents.

Construction activities would not introduce chemical, biological, physical agents, or situations that have the potential to disproportionately and adversely affect the health or environment of low-income or minority populations. The project would create long-term benefits by correcting safety deficiencies associated with Tsaile Dam and improving conditions that support expenditures for recreation-related permits, goods and services.

Construction dewatering would provide stream flow that could be diverted by canyon farmers to irrigate croplands and orchards during the growing seasons in 2012 and 2013. Those flows potentially would have a short-term beneficial effect on agricultural production, which could result in slight economic gain for farmers with irrigated agricultural fields.

Following construction, normal spring-season releases from the dam may be interrupted while the reservoir refills. This could result in reduced water supply for diversion onto croplands and orchards in Canyon del Muerto, potentially lowering crop yields on irrigated lands during the 2014 growing season. To obviate this concern, NNDWR would make periodic releases from the Tsaile Dam while the reservoir is being refilled. In the long term, resumption of unrestricted water storage in the reservoir may improve conditions for future irrigation releases from the dam.

Alternative B

The effects to EO 12898 populations and socioeconomic factors would be similar to those described under the Preferred Action, except Alternative B would require an additional 9 months to complete.

Cumulative Effects

Construction and the temporary loss of the water-based recreational resource would have a slight adverse socioeconomic effect on the population segment that lives in CT 9441. That negative effect on the CT 9441 segment would be reversed once the reservoir refills and the recreational resource is restored. Construction dewatering could result in a slight economic gain for downstream irrigators (part of the CT 9442 population segment) in 2012 and 2013. Those potential gains would disappear while the reservoir refills in 2014.

3.10 TRANSPORTATION

3.10.1 Affected Environment

BIA maintained highways and local roads carry the majority of traffic in the vicinity of the project area. Navajo Routes 64 and 12 link the Tsaile area with Chinle, Window Rock, and I-10 further south, and are the primary carriers of regional tourist traffic. Although several unpaved roads intersect Navajo Routes 64 and 12 north of the project area, only one road, Route 8077, continues south to Tsaile Dam. Route 8077, which crosses Tsaile Dam and spillway, is the only maintained road that serves residences along the south rim of Canyon del Muerto. This road is also a school bus route administered by Chinle Unified School District Number 24. Traffic on Route 8077 is sporadic and volumes are low. Snowmelt and heavy rains periodically create difficult travel conditions on unpaved roads such as Route 8077. Use of Route 8077 to access areas south of Tsaile Dam is precluded when flows are present in the spillway channel.

Approximately 16 miles of unpaved roads provide vehicular access into mainstem Canyon del Muerto. The road system originates near the mouth of Canyon del Muerto and terminates approximately 9 miles downstream of Tsaile Dam. Traversing several low-water stream crossings and short reaches of channel, these roads provide access to residents and concessionaires that lead guided tours into the canyon and offer the only land-based route for emergency services in case of injury or illness. Access is precluded

when high-level stream flow inundates the low water crossings. High-level flows can also damage the crossings, necessitating repairs by the NPS.

3.10.2 Environmental Consequences

No Action

Under the no action alternative, there would be no indirect effect on transportation because no project would be constructed or implemented. Existing transportation patterns would persist in the project area and Canyon del Muerto.

Alternative A (Preferred Action)

Construction would result in temporary closure of approximately 1,500 feet of Route 8077 at Tsaile Dam. Traffic would be diverted to an existing but presently closed road that crosses Tsaile Creek approximately 400 feet downstream of the dam (Figure 6). Improvements to the road surface, such as grading and application of aggregate, would be needed before the bypass could be used by local traffic. The bypass would accommodate one-way traffic at restricted speeds. Flag persons or electric signals would be employed to safely move traffic past the construction area with minimal delay.

Route 8077 would be used for construction haulage between the project area and Navajo Route 64 (Figure 6). This road would avoid populated areas and primary travel routes to Dine College and residential areas north of the college.

Following construction, the bypass would be closed and Route 8077 across Tsaile Dam would be reopened.

Flow rates from dewatering would be monitored to ensure vehicular access into Canyon del Muerto is not impeded and low-water crossings are not damaged. If access is hampered at a particular flow rate, flows would be decreased until desirable conditions are achieved.

Alternative B

The effects to transportation would be similar to those described under the Preferred Action; however, the duration of effects under Alternative B would persist up to 9 months longer.

Cumulative Effects

The cumulative effects of the project during construction include increased local traffic volumes and potential traffic delays on Route 8077. Existing traffic volumes are low, so the addition of construction traffic combined with short delays at the bypass are not expected to substantially impede traffic flow or transit time. The BIA would ensure that

the haul route is maintained in serviceable condition. No cumulative effect to vehicular access in Canyon del Muerto is anticipated.

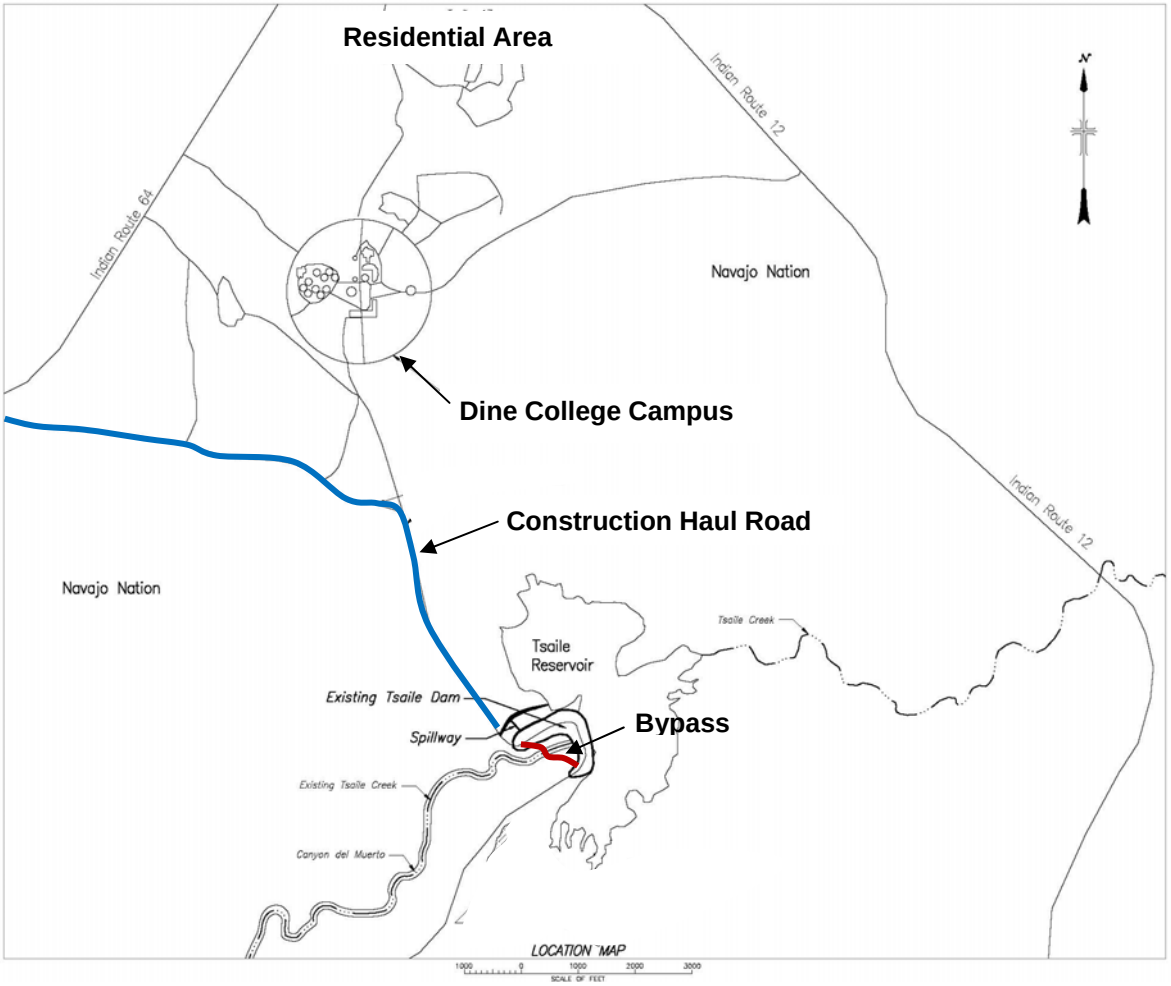

Figure 8. Construction bypass and haul routes.

- All construction equipment at the project site would be periodically inspected for leaks. Any significant leaks would be promptly corrected.

- Secondary containment would be provided for all on-site hazardous material storage. All on-site storage would occur at designated contractor-use areas.

- All waste would be removed following construction and transported to an appropriately permitted disposal facility.

- Land contours in construction areas not required for permanent facilities such as the dam and outlet works would be restored to conform to original conditions.

- Removal of native vegetation would be minimized to the extent practicable.

- Best management practices (BMPs) outlined in a storm water pollution plan would be implemented to minimize soil erosion. These BMPs may include installation of silt fencing, anchored straw bales, mats, or mulch.

- Dewatering releases from the Tsaile Reservoir prior to and during construction would be monitored and adaptively controlled to ensure that vehicular access into Canyon del Muerto is not impeded and stream banks are not eroded.

- Adequate soil moisture would be maintained on unpaved haul roads to minimize visible dust emissions.

- Earth-moving activities would be reduced during periods of high winds (i.e., sustained winds of greater than 25 miles per hour).

- Disturbed sites would be stabilized and reseeded where appropriate.

- BIA Route 8077 would be used for construction haulage between Navajo Route 64 and Tsaile Dam to avoid populated areas.

- In the event of a discovery of previously undocumented cultural resources, all construction in the immediate vicinity of the discovery would be suspended pending notification to NNHPD.

CHAPTER 5 - AGENCIES AND PERSONS CONSULTED

Reclamation submitted information on the proposed project to the following entities during development of the EA. The names of individuals are retained in the administrative record.

List of Agencies and Persons Contacted

Chinle Unified School District No. 24, Transportation Department
Dine College
Hopi Cultural Preservation Office
Navajo RC&D
Navajo Nation Environmental Protection Agency
Navajo Nation Parks and Recreation Department
Navajo Nation Fish and Wildlife Department
Navajo Nation Historic Preservation Department
Navajo Nation Land Department
Navajo Nation Chinle Chapter
Navajo Nation Tsaile/Wheatfields Chapter
U.S. Army Corps of Engineers

Cooperating Agencies

Bureau of Indian Affairs
Navajo Nation Department of Water Resources
National Park Service
U.S. Fish and Wildlife Service

CHAPTER 6 - LIST OF PREPARERS

List of Preparers

John McGlothlen, Reclamation, NEPA Specialist
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Other Contributors

Jeff Wormer, Reclamation, Civil Engineer

CHAPTER 7 - RELATED ENVIRONMENTAL LAWS/DIRECTIVES

The following is a list of selected statutes, regulations, and EOs that apply to actions discussed in this EA:

National Environmental Policy Act (NEPA) of 1969, as amended - NEPA requires Federal agencies to evaluate the potential environmental consequences of major Federal actions. An action becomes "Federalized" when it is implemented, wholly or partially funded, or requires authorization by a Federal agency. The intent of NEPA is to promote consideration of environmental impacts in the planning and decision-making process prior to project implementation. NEPA also encourages full public disclosure of the proposed action, accompanying alternatives, potential environmental effects, and mitigation.

This EA complies with the CEQ and Department of Interior regulations implementing NEPA. Scoping information and the draft EA were made available for public review.

Fish and Wildlife Coordination Act (FWCA) of 1934, as amended - The FWCA provides a procedural framework for the consideration of fish and wildlife conservation measures in Federal water resource development projects. Coordination with the FWS and State wildlife management agencies (or appropriate Tribal agency if implemented in Indian Country) is required on all Federal water development projects.

The FWS and NNDFW were consulted on mitigation strategies for ameliorating impacts to bald eagle and other wildlife. In addition, the FWS also served as a cooperating agency in the preparation of the NEPA analysis. This review and consultation process satisfies the coordination requirements of the FWCA.

Endangered Species Act (ESA) of 1973, as amended - The ESA provides protection for plants and animals that are currently in danger of extinction (endangered) and those that may become so in the foreseeable future (threatened). Section 7 of this law requires Federal agencies to ensure that their activities do not jeopardize the continued existence of threatened or endangered species or adversely modify designated critical habitat.

Reclamation has determined that the project would not affect species listed or proposed for listing under ESA.

Migratory Bird Treaty Act (MBTA) of 1918, as amended - The MBTA is the domestic law that implements the United States' commitment to the protection of shared migratory bird resources. The MBTA prohibits the take, possession, import, export, transport, selling, or purchase of any migratory bird, their eggs, parts, or nests.

The project would not violate provisions of the MBTA.

Bald and Golden Eagle Protection Act of 1940, as amended – This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their nests, or eggs. The Act defines take as "pursue, shoot, poison, wound, kill, capture, trap, collect, molest or disturb." Disturb is further defined as injury; decreased productivity by substantially interfering with normal breeding, feeding or sheltering behavior; or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

Reclamation consulted with FWS on potential effects of the project on resident bald eagles. To ensure compliance with the Act, Reclamation would obtain a permit to authorize dewatering and other construction disturbances that might constitute take.

Clear Air Act (CAA) of 1963, as amended - The CAA requires that any Federal entity engaged in an activity that may result in the discharge of air pollutants must comply with all applicable air pollution control laws and regulations (Federal, State, or local). It also directs the attainment and maintenance of NAAQS for six different criteria pollutants including carbon monoxide, ozone, particulate matter, sulfur oxides, oxides of nitrogen, and lead.

Air quality in the project area is in attainment of NAAQS. Short-term construction emissions associated with the proposed action would have localized and minor effects on air quality.

Clean Water Act (CWA) of 1977, as amended - The CWA strives to restore and maintain the chemical, physical, and biological integrity of the nation's waters by controlling discharge of pollutants. The basic means to achieve the goals of the CWA is through a system of water quality standards, discharge limitations, and permits. Section 404 of the CWA identifies conditions under which a permit is required for actions that result in placement of fill or dredged material into waters of the United States. In addition, a 401 water quality certification and 402 National Pollutant Discharge Elimination System (NDPES) permit are required for activities that discharge pollutants into waters of the United States. On the Navajo Nation, Region 9 of the EPA is responsible for issuing NPDES permits, while the tribe has primacy for issuing Water Quality Certifications.

A water quality certification under CWA Section 401 and permit coverage under CWA Sections 402 and 404 would be obtained prior to construction.

National Historic Preservation Act (NHPA) of 1966, as amended - Federally funded undertakings that have the potential to affect historic properties are subject to Section 106 of the NHPA. Under this act, Federal agencies are responsible for the identification, management, and nomination to the National Register of Historic Places of cultural resources that would be affected by Federal actions. Consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office (or Tribal Historic Preservation Office) is required when a Federal action may affect cultural resources on, or eligible for inclusion on, the National Register.

Consultation with the NNHPD regarding effects to historic properties within the project area was completed by Reclamation. The proposed action would have no effect on cultural resources.

Native American Graves Protection and Repatriation Act (NAGPRA) - NAGPRA is intended to ensure that Native American human burials, associated and unassociated funerary objects, sacred objects, and items of cultural patrimony currently curated by Federal agencies, or by museums or institutions receiving Federal funding, are identified and inventoried for possible return to an appropriate tribe. NAGPRA provides regulations covering how the intentional excavation or accidental discovery of Native American human remains and associated cultural items on Federal or tribal lands must be handled.

There are no known human burials within the project area.

Resource Conservation and Recovery Act (RCRA), as amended - RCRA establishes thresholds and protocols for managing and disposing of solid waste. Solid wastes that exhibit the characteristic of hazardous waste, or are listed by regulation as hazardous waste, are subject to strict accumulation, treatment, storage, and disposal controls.

The project is not expected to generate hazardous waste as defined and regulated under RCRA. To minimize the possible impact of hazardous materials (petroleum, oil, and lubricants) used during construction, all equipment would be periodically inspected for leaks. Any significant leaks would be promptly corrected. Nonhazardous solid waste would be disposed of in accordance with State and Federal regulations at an EPA-approved landfill. Spills and disposal of contaminated media would be managed in accordance with tribal and Federal requirements.

EO 11988 (Floodplain Management) - This Presidential directive encourages Federal agencies to avoid, where practicable alternatives exist, the short- and long-term adverse impacts associated with floodplain development. Federal agencies are required to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility.

The proposed project would improve public safety and reduce the risk of potential flood losses associated with failure of Tsaile Dam.

Secretarial Order 3175 (incorporated into Departmental Manual at 512 DM 2) requires that if any Department of the Interior agency actions impact Indian trust assets (ITAs), the agency must explicitly address those impacts in planning and decision-making, and the agency must consult with the tribal government whose trust resources are potentially affected by the Federal action. Reclamation is committed to carrying out its activities in a manner which avoids adverse impacts to ITAs when possible, and to mitigate or compensate for such impacts when it cannot.

The proposed project would improve the Tribe's access to the water right associated with Tsaile Creek by restoring the full water storage capability of Tsaile Dam. Resumption of unrestricted water storage in the reservoir would improve conditions for fish and wildlife resources and may improve conditions for future irrigation releases from the dam. Adverse effects to land resources that result from construction would be mitigated.

EO 12898 (Environmental Justice) - This Order directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations.

No high and disproportional adverse impacts on low-income or minority populations as defined by EO 12898 would result.

Farmland Protection Policy Act of 1981, as amended – This law is intended to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural purposes. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, and oilseed crops and is also available for these uses. In general, prime farmland has acceptable soil conditions with few rocks, a favorable temperature and growing season, and an adequate and dependable water supply from precipitation or irrigation. Unique farmland is land other than prime farmland that is used for production of specific high-value foods and fiber crops.

The proposed project would not convert farmland to nonagricultural uses.

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APPENDIX A

Cross-Section View of Tsaile Dam and Proposed Stability Berm

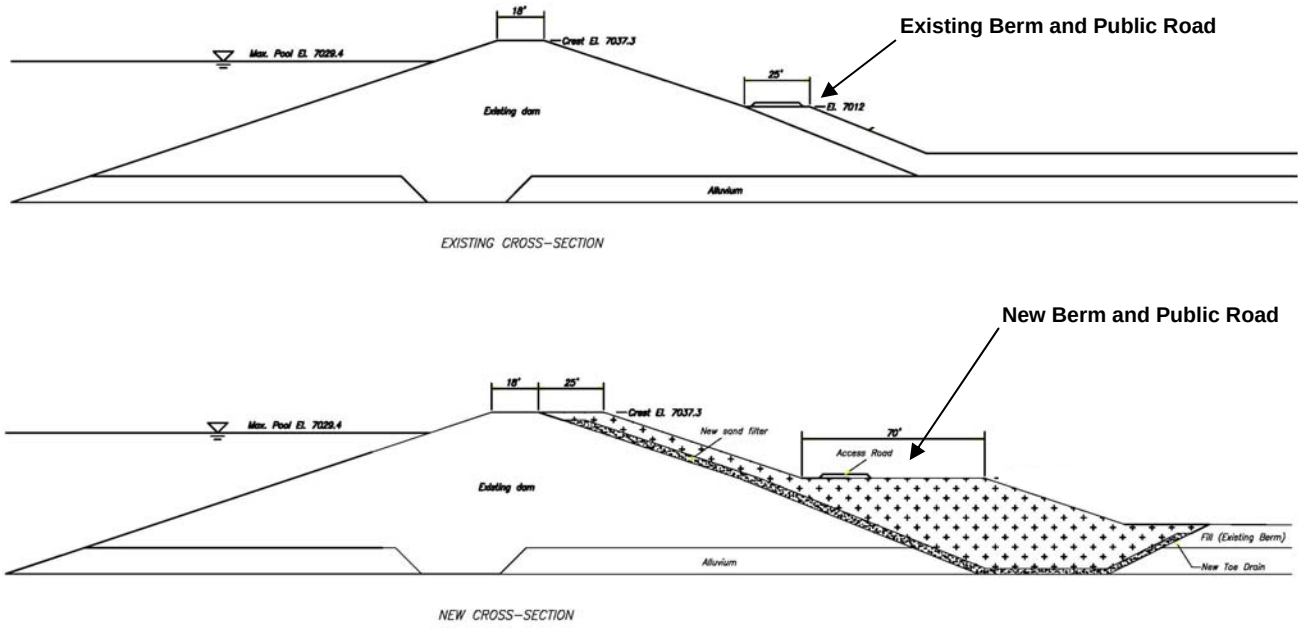

Figure A-1. Comparison of existing berm vs. proposed berm.