

RECLAMATION

Managing Water in the West

Final Environmental Assessment

Captain Tom Dam Modifications

Safety of Dams Project



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

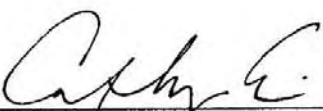
May 2009

United States Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Phoenix Area Office

FINDING OF NO SIGNIFICANT IMPACT

Captain Tom Dam Modifications
Safety of Dams Project

Navajo Nation
San Juan County, New Mexico

Approved: 
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Date: 5/6/09

FONSI No. PXAO-09-2

INTRODUCTION

In accordance with the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, as amended), the Bureau of Reclamation has issued the attached final environmental assessment (EA) to disclose the potential environmental impacts resulting from implementation of Safety of Dams (SOD) corrective action at Captain Tom Dam on the Navajo Nation in San Juan County, New Mexico.

The proposed project will correct significant safety deficiencies which caused the Navajo Nation Department of Water Resources (NNDWR) to suspend operation of Captain Tom Dam in 2004 and install a siphon to drain the reservoir. Captain Tom Reservoir has not stored water since early 2004, depriving Navajo farmers with an important water supply for irrigation.

BACKGROUND

Corrective action is needed to return Captain Tom Dam to active operation and preserve the irrigation and livestock watering value for which the dam was originally authorized. A Report of Findings for the Deficiency Verification Analysis prepared by Reclamation in 2005 identified six potential failure modes associated with the dam. These consist of a lack of adequate erosion protection on the upstream embankment, inadequate freeboard, inadequate reservoir evacuation capability due to a partially collapsed outlet works pipe, potential liquefaction of the dam and foundation soils during a 10,000-year return period earthquake, seepage and internal erosion of the embankment, and seepage and internal erosion associated with the partially collapsed outlet works pipe.

ALTERNATIVES CONSIDERED

No Action. Under the No Action alternative, none of the proposed SOD corrective actions would be implemented. Without suitable corrective action, existing safety deficiencies will persist, and no water could be safely stored in the reservoir in the reasonably foreseeable future.

Proposed Action. Under the Proposed Action, the existing dam will be modified with a new outlet works and impact basin, a downstream stability berm that is keyed into foundation alluvium, and a new seepage filtration and drainage system. This new configuration will raise the crest height 1 foot, create a crest width of 30 feet, and extend the embankment toe approximately 40 feet downstream from its present location. Armoring on the upstream embankment will consist of riprap. New facilities will include an intake structure, a reinforced concrete conduit through the dam lined with a dual-walled, high-density polyethylene (HDPE) pipe, a control structure, a Type VI stilling basin, and a riprap-lined outlet channel leading to the existing irrigation canal. The new outlet works conduit will be pressurized throughout the dam with regulating gates in the control structure at the downstream end. In addition to modification of the dam, the To-dil-hil Wash diversion ditch will be cleared of obstructions and reopened.

Alternatives A. Under Alternative A, the existing dam would be removed and replaced with a new embankment and outlet works. The crest height of the new dam would be 1 foot higher than

the old dam. Armoring on the upstream embankment would consist of riprap or soil cement. New facilities consisting of a concrete intake structure; 30-inch-diameter, steel-lined, reinforced-concrete conduit (either pressurized or nonpressurized); concrete gate house at the discharge portal; and Type IV stilling basin would be constructed along the same alignment as the old outlet works. The design of the outlet works would generally be similar to the Proposed Action.

Alternative B. Under Alternative B, the existing dam would be removed and a new dam constructed on an alignment centered approximately 600 feet downstream. The new dam would have an angled configuration with a total length of 2,600 feet and maximum crest height of 30 feet above the land surface. Armoring on the upstream embankment would consist of riprap or soil cement. The outlet works would consist of an intake structure, a reinforced-concrete conduit equipped with a dual-walled HDPE liner, a valve house, a Type VI stilling basin, and a riprap-lined outlet channel leading to a reinforced-concrete canal. The outlet conduit would consist of a pressurized dual-walled HDPE pipe with a 30-inch-diameter carrier pipe within a 42-inch-diameter, concrete-encased carrier pipe.

CONSULTATION, COORDINATION, AND PUBLIC INVOLVEMENT

On May 17, 2007, Reclamation posted the scoping notice on its Phoenix Area Office Web site and mailed scoping information to public agencies, tribal governments, and interested individuals. A public scoping meeting was held at the Newcomb Chapter House in Newcomb, New Mexico, on July 20, 2007. Fourteen people attended the Newcomb meeting. Reclamation received four letters of comment (including e-mail) in response to public scoping.

Several issues were identified from discussions among the NEPA interdisciplinary team, resource specialists from the Navajo Nation, and the public during scoping. The following environmental issues were considered early in the planning process and contributed to the development of mitigation strategies.

- potential effects to biological resources, including threatened and endangered species
- potential effects to water resources
- potential effects to cultural resources, including human burials
- potential effects to downstream water users

The draft EA was mailed to potentially affected or interested individuals and agencies for a 30-day public comment period on August 1, 2008. In addition, news releases were sent to the *Navajo Times* and seven other major news media outlets serving northwestern New Mexico and the Navajo Nation regarding the availability of the draft EA. The draft EA was also available on Reclamation's Phoenix Area Office Web site at <http://www.usbr.gov/lc/phoenix>. In response to the draft EA, the U.S. Fish and Wildlife Service provided recommendations to minimize impacts on wildlife (see Appendix B of the final revised EA). Those recommendations will be taken into consideration during implementation of the project. No other comments on the draft EA were received by Reclamation.

Following release of the draft EA, the NNDWR, the Bureau of Indian Affairs, and Reclamation reassessed and substantially revised the preferred alternative to address only those deficiencies that presented high risk of embankment failure in an effort to reduce construction costs (Reclamation 2008a and 2008b). These revisions necessitated that the EA be re-issued as a revised draft to give the public an opportunity to comment on the potential environmental implications of the new proposal. The revised draft EA was released to the public on March 26, 2009. No comments on the revised draft EA were received by Reclamation.

Consultation with the Navajo Nation Historic Preservation Department (NNHPD) regarding effects to historic properties within the project area was completed by Reclamation in 2008. The proposed project would not affect significant cultural resources.

MAJOR CONSIDERATIONS

The following issues that were addressed in the EA have been taken into consideration in Reclamation's deliberation whether a Finding of No Significant Impact is appropriate, or an environmental impact statement should be prepared.

1. Beneficial and adverse environmental impacts. The EA demonstrates that there will be no significant adverse or beneficial impacts on the quality of the human environment including water, air, land use, soil, and cultural and biological resources. Impacts to physical and biological resources will be highly localized and minor.
2. Public health and safety. Public health will not be affected by the project. There will be no disproportionately high and adverse human health effects on populations defined in Executive Order 12898 (Environmental Justice) or the general public. Controlled access to active work areas and appropriate hazardous material management and waste disposal associated with construction will minimize any potential risks to public health, safety, and the environment. Corrective action will substantially reduce the probability of embankment failure and associated risk to the public from continued operation of the dam.
3. Unique characteristics of the geographic area. The project area is not unique within its geographical setting and is similar to many other areas of tribal land in the region. There are no prime farmland, wild and scenic rivers, wilderness areas, refuges, park lands, unique ecological areas, or other unique or rare characteristics of the land and aquatic environs that will be significantly affected. Loss of a depauperate 0.2-acre *Juncus* wetland at the toe of the dam is not significant.
4. Degree to which the effects on the quality of the human environment are likely to be highly controversial. There are no known scientific controversies over the effects of the proposed project on the human environment.
5. Degree to which the effects are highly uncertain or involve unique or unknown risks. There are no known effects on the human environment that are highly uncertain or involve unique or

unknown risks. The proposed modifications are consistent with standard engineering criteria used in the design of modern earth-fill dams in the United States.

6. Degree to which this action will establish a precedent for future action with significant effects. This project does not set a precedent for similar projects that may be implemented by Reclamation or other agencies. Reconstruction of faulty or failing dams is a standard practice that enhances public safety and welfare.

7. Relationship to other actions with cumulatively significant impacts. Cumulative effects of the proposed project were considered in the EA. There are no known incremental effects of the action that become significant when added to other past, present, or reasonably foreseeable future actions that have affected, or will affect, the project area.

8. Degree to which the action may affect districts, sites, objects, or structures listed on, or eligible for, the National Register of Historic Places, or may cause loss of significant cultural resources. A Class III (intensive) survey of the area of potential effect for the proposed project indicated that no significant historical or archaeological sites will be adversely affected. Reclamation consulted with NNHPD and other Native American Indian Tribes that have possible cultural affinities or other interests in the project area. The NNHPD concurred with Reclamation's no effect determination in October 2008. No areas of traditional cultural importance or areas of specific tribal concern have been identified in the project area.

9. Degree to which the action may affect threatened, endangered, or sensitive species or their habitat. The EA demonstrates that Navajo or federally listed species or federally proposed species will not be affected by the proposed project.

10. Whether the action violates Federal, State, or local laws or requirements imposed for the protection of the environment. The proposed project will not violate any Federal, State, or local environmental laws or requirements.

11. Indian trust assets will not be adversely affected.

12. The mitigation requirements identified in the final EA will be implemented by Reclamation.

FINDING OF NO SIGNIFICANT IMPACT

Based upon a review of public comments and consideration of the impacts presented in the final EA, Reclamation has determined the Proposed Action will not significantly impact the human environment and that preparation of an environmental impact statement is not warranted.

Documents cited above.

Bureau of Reclamation (Reclamation). 2009. Final environmental assessment for Captain Tom Dam modifications. Safety of Dams Project. Phoenix Area Office, Phoenix, AZ. (Attached)

Final Environmental Assessment

Captain Tom Dam Modifications

Safety of Dams Project

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CHAPTER 1 - PURPOSE AND NEED

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) corrective action at Captain Tom Dam on the Navajo Nation in San Juan County, New Mexico. The EA was prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508), and Reclamation NEPA Handbook. Reclamation is the lead Federal agency pursuant to NEPA. The Bureau of Indian Affairs (BIA) and Navajo Nation Department of Water Resources (NNDWR) SOD Program are cooperating agencies for the preparation of this document.

This document is organized into six chapters:

- *Chapter 1 - Purpose and Need:* 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 section also details how the lead agency informed the public of the proposal and how the public responded.
- *Chapter 2 - Comparison of Alternatives, including the Proposed Action:* Provides a detailed description of the lead agency's proposed action, alternative methods for satisfying the stated purpose and need, and key environmental issues regarding the proposed action and alternatives. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3 - Environmental Consequences:* Describes the environmental effects of implementing the proposed action and other action alternatives. The analysis is organized by affected resource topic. Within each section, the affected environment is described first, followed by the effects of no action, the proposed action, and other action alternatives.
- *Chapter 4 - Agencies and Persons Consulted:* Lists preparers and agencies consulted during the development of the EA.
- *Chapter 5 - Environmental Laws and Directives:* Lists relevant Federal environmental laws and directives.
- *Chapter 6 - Literature Cited:* Lists documents used in the preparation of this EA.
- *Appendices:* The appendices provide more detailed information to support the analysis presented in the EA.

1.2 Background

The Navajo Nation and BIA propose to correct verified high-risk safety deficiencies associated with Captain Tom Dam. Captain Tom Dam is an off-stream impoundment of the Captain Tom Wash along the eastern foothills of the Chuska Mountains. Construction of the dam was completed in 1937 by the Navajo Nation to provide a reliable water supply for irrigation and livestock. Similar in many respects to other major dams on the Navajo Nation, Captain Tom Dam consists of a homogenous earthen embankment, gated outlet works, and uncontrolled spillway.

Captain Tom Dam has a length of 2,020 feet and a maximum height of 28 feet at the crest elevation of 5,675. The outlet works consist of a 24-inch-diameter, 168-foot-long, steel-lined concrete pipe with a concrete headwall and trashrack at the inlet. A 24-inch-diameter slide gate controls flow through the outlet works. An outlet structure consisting of a concrete headwall at the downstream embankment toe discharges into a concrete-lined irrigation canal. Water is conveyed through the canal to a complex of unlined irrigation ditches that serve agricultural fields east of the dam. Maximum computed discharge capacity of the outlet works is 64 cubic feet per second (cfs).

The spillway is located in a natural depression on the right side of the reservoir rim approximately 2,000 feet southwest of the right abutment of the dam. Founded on bedrock, the spillway consists primarily of a stone masonry wall approximately 2-feet high and 521-feet long. An additional 100-foot-long section of spillway to the right of the masonry wall utilizes exposed bedrock. Discharges from the spillway are conveyed through an area of low topographic relief to Captain Tom Wash. A complete operating history of the spillway is unavailable, and there are no known records of spillway flow.

Captain Tom Dam is operated by the NNDWR SOD Program. In 2004, significant safety concerns caused the NNDWR to suspend dam operations and install a siphon to drain the reservoir. Under normal operating conditions, runoff from snowmelt and rainfall is diverted from Captain Tom Wash and conveyed through a 2.5-mile-long ditch to a natural drainage that discharges into the reservoir.

1.3 Purpose and Need for Action

Corrective action is needed to preserve the irrigation and livestock watering value for which the reservoir was originally authorized and to substantially reduce the probability of embankment failure and associated risk to the public from continued operation of the dam.

Failure of Captain Tom Dam, with the water level at the dam crest, would threaten all residences that are within 500 feet of Captain Tom Wash as far downstream as the confluence of the wash with the Chaco River. According to the Downstream Hazard Classification study, there are approximately 150 lives at risk if the dam fails (Leedshill-Herkenhoff 1987). Most of this population is distributed between the dam and the community of Newcomb. The Special Examination Report indicated that Captain Tom Dam is classified as high hazard because of the threat to the local population and Highway 491 (BIA 2004).

The following verified SOD deficiencies are described in greater detail in the Report of Findings for the Deficiency Verification Analysis (DVA) prepared by Reclamation (2005a).

- *Lack of adequate erosion protection on the upstream slope.* The upstream slope protection consists of sparse and under-sized rock. Wave action has severely eroded the upstream embankment, which is comprised of highly erodible, silty sand material.

- *Inadequate freeboard.* A freeboard deficiency exists under normal operating conditions. Winds and subsequent reservoir waves could cause overtopping. Due to the nature of the embankment material, even a small amount of sustained overtopping is likely to lead to a breach of the dam.
- *Inadequate reservoir evacuation capability.* The outlet works pipe has partially collapsed, precluding operational releases through the outlet works. With no means to release water from the reservoir, the capacity to evacuate the reservoir is considered a safety deficiency.
- *Liquefaction of the dam and foundation soils.* The DVA determined that the embankment and foundation will liquefy during a 10,000-year return period earthquake resulting in dam failure.
- *Seepage and internal erosion of the embankment.* Existing seepage through the embankment could result in dam failure due to internal erosion of embankment material.
- *Seepage and internal erosion associated with the partially collapsed outlet works.* Existing seepage through the embankment and piping of embankment material into the collapsed outlet works pipe are potentially serious failure modes.

1.4 Project Location

Captain Tom Dam is located in the Toadlena/Two Grey Hills Chapter of the Navajo Nation approximately 55 miles north of Gallup and 2.4 miles west of Newcomb, New Mexico (Figure 1). However, most of the farms that are dependent on irrigation releases from Captain Tom Dam occupy lands east of dam in the Newcomb Chapter. The project area includes the dam, a portion of the dewatered reservoir, a small area near the left abutment, and the To-dil-hil Wash diversion ditch (Figure 2). This area is equivalent to the temporary construction easement shown in Figure 3.

1.5 Public Involvement

The 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.

On May 17, 2007, Reclamation posted the scoping notice on its Phoenix Area Office Web site and mailed scoping information to public agencies, tribal governments, and interested individuals. A public scoping meeting was held at the Newcomb Chapter House in Newcomb on July 20, 2007. Fourteen people attended the Newcomb meeting.

Reclamation received four letters of comment (including e-mail) in response to public scoping.

Several issues were identified from discussions among the NEPA interdisciplinary team,¹ resource specialists from the Navajo Nation, and the public during scoping. The following environmental issues were considered early in the planning process and contributed to the development of mitigation strategies.

- potential effects to biological resources, including threatened and endangered species
- potential effects to water resources
- potential effects to cultural resources, including human burials
- potential effects to downstream water users

The draft EA was mailed to potentially affected or interested individuals and agencies for a 30-day public comment period on August 1, 2008. In addition, news releases were sent to the *Navajo Times* and seven other major news media outlets serving northwestern New Mexico and the Navajo Nation regarding the availability of the draft EA. The draft EA was also available on Reclamation's Phoenix Area Office Web site at <http://www.usbr.gov/lc/phoenix>. In response to the draft EA, the U.S. Fish and Wildlife Service (FWS) submitted a letter that included recommendations to minimize impacts on wildlife (see Appendix B). Those recommendations will be taken into consideration during development of the project. No other comments were received on the draft EA.

Following release of the draft EA, the NNDWR, BIA, and Reclamation reassessed and substantially revised the preferred alternative to address only those deficiencies that presented high risk of embankment failure in an effort to reduce construction costs (Reclamation 2008a and 2008b). Because the preferred alternative was changed, the EA was re-issued as a revised draft to give the public an opportunity to comment on the potential environmental implications of the new proposal. The revised draft EA was posted on the Phoenix Area Office web site and distributed for public comment on March 26, 2009. No public comments were received by Reclamation.

1.6 Decisions to be Made

Reclamation prepared the engineering designs for the proposed project and is the lead Federal agency responsible for determining whether the proposal will have a significant effect on the human environment. In addition, Reclamation is responsible for managing the construction phase of the project. The Navajo Nation and BIA must decide whether to implement the Proposed Action, another action alternative, or take no action.

¹ The NEPA interdisciplinary team consisted of biologists, archaeologists, and engineers from Reclamation and SOD staff from the Navajo Nation and BIA.

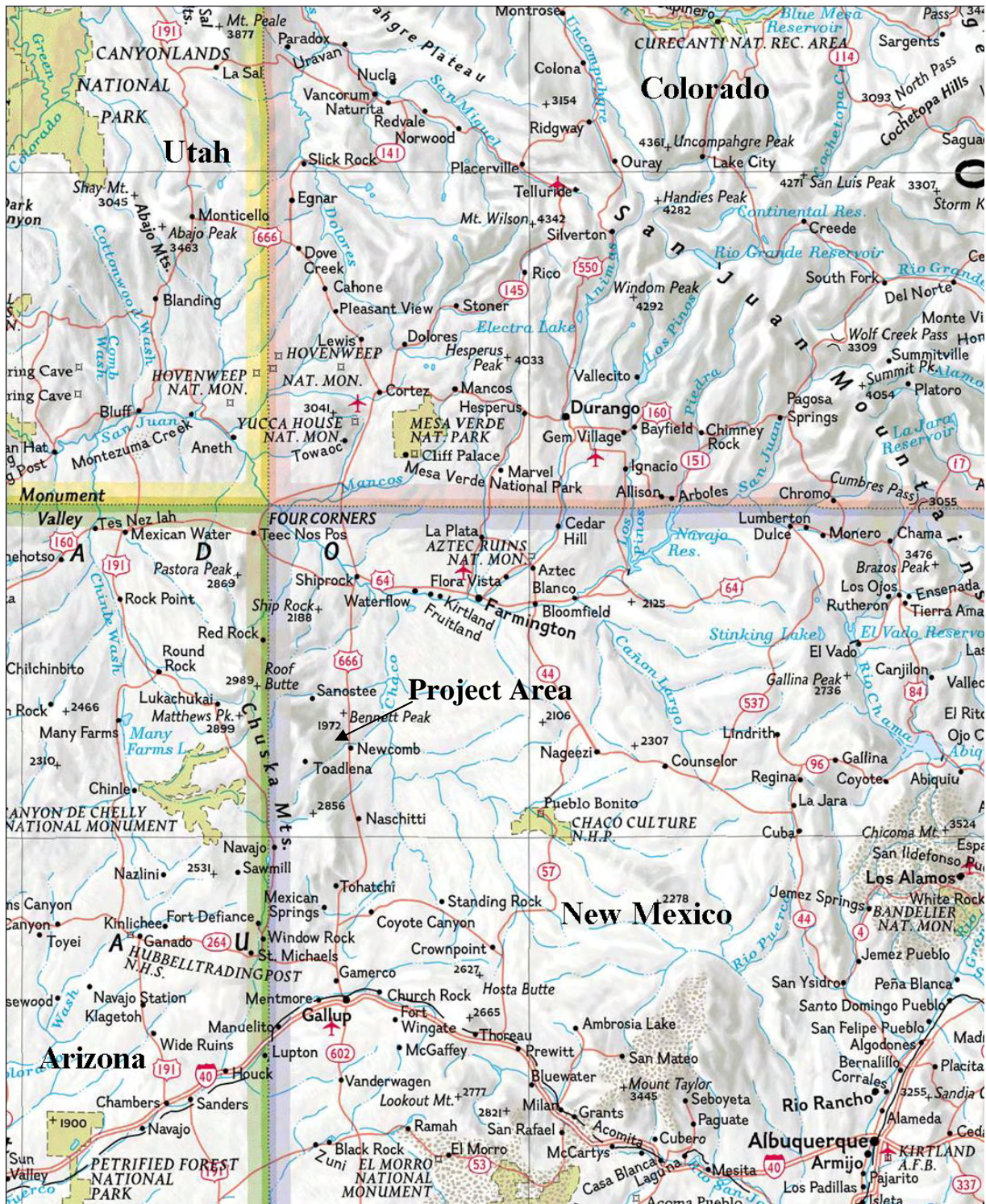


Figure 1. Project location map.

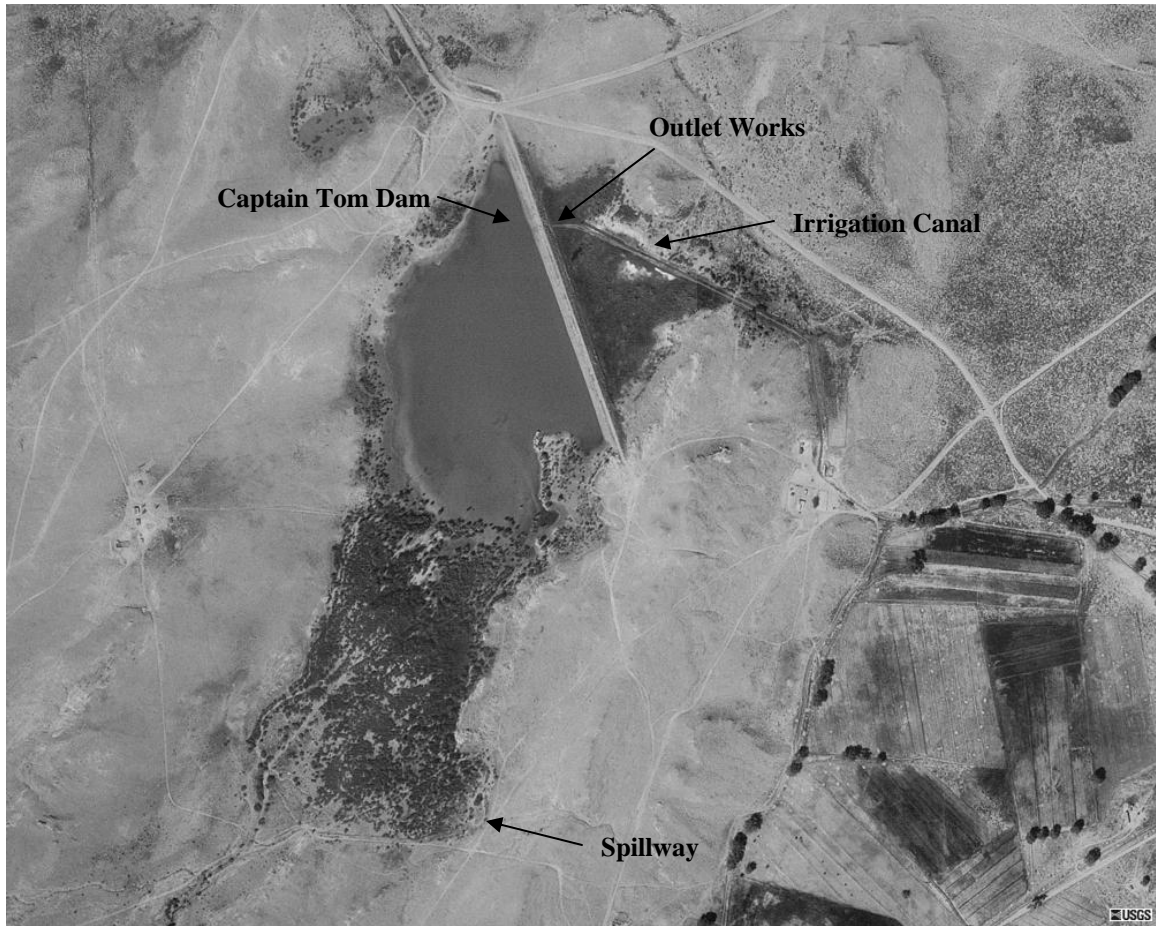


Figure 2. Existing infrastructure at Captain Tom Dam.

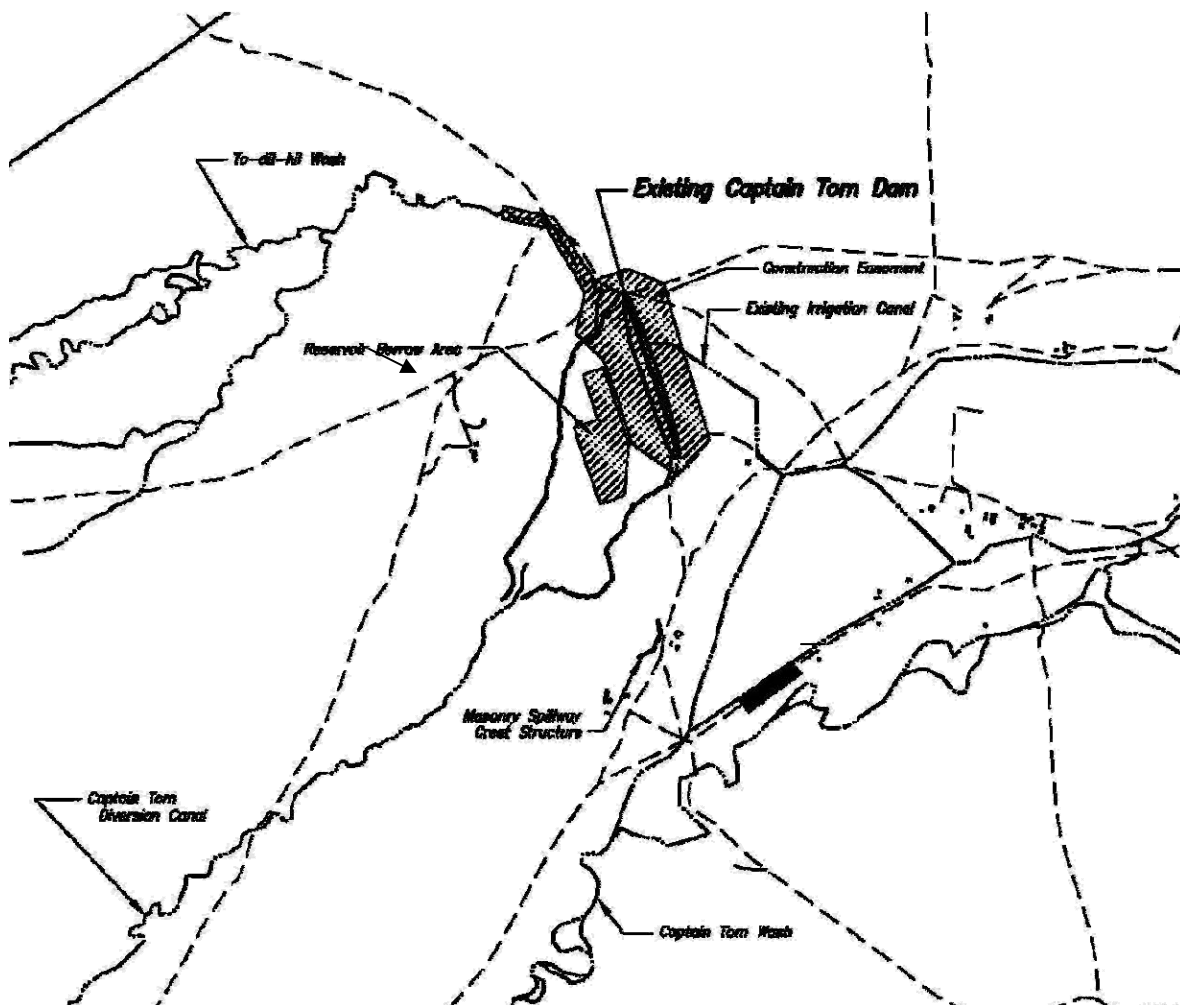


Figure 3. Proposed temporary construction easement with borrow area.

CHAPTER 2 - DESCRIPTION OF ALTERNATIVES

The EA analyzes three design alternatives for addressing the purpose and need for the project. No action is also included. The design alternatives are the result of an analytical process which identified safety issues (Reclamation 2005b and 2005c) and formulated engineering designs (Reclamation 2007 and 2008b) 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 Denver Technical Service Center. Correction of verified SOD deficiencies would result in one of the actions 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 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, none of the SOD corrective actions described below would be implemented. Without suitable corrective action, existing safety deficiencies will persist, and no water could be safely stored in the reservoir in the reasonably foreseeable future.

2.2 Proposed Action – Construct New Outlet Works and Downstream Stability Berm on Existing Dam

BIA and the NNDWR propose the following project to correct verified safety deficiencies and restore operation of Captain Tom Dam. Potential construction impact areas are also described. Implementation of the Proposed Action would take approximately 2 years to complete. Construction is scheduled to begin in September 2009.

Dam Embankment. Under the Proposed Action, the existing dam would be modified with a new outlet works and downstream stability berm. Two feet of material would be stripped off the existing downstream embankment from the ground surface up to the existing crest elevation. A foundation key trench would be excavated about 1,400 feet along the downstream toe to an approximate depth of 5 feet below the existing ground surface. An earth-fill berm would be placed over the trench, forming the new downstream slope of the embankment. This new configuration would raise the crest height 1 foot to elevation 5,676, create a crest width of 30 feet, and extend the embankment toe approximately 40 feet downstream from its present location. The berm would have a 2H:1V slope, except for a 25-foot-wide horizontal bench at elevation 5,655. The existing upstream embankment would be armored with riprap.

During construction, a 5-foot-wide (measured horizontally) sand filter and a 5-foot wide (measured horizontally) gravel drain would be installed against the downstream slope of the existing embankment and the walls of the foundation key trench. The gravel and filter would extend from the spillway elevation down to the foundation along the downstream slope and extend along the foundation to the toe drain. A geotextile membrane would be placed between the gravel and new earth-fill to provide additional filter capability. Embankment and foundation seepage from the gravel drain would be collected and transported by a toe drain system to the new outlet works stilling basin. The toe drain system would include a 12-inch-diameter perforated pipe, cleanouts, inspection wells, and outfalls for gravity flow.

This alternative would require approximately 45,000 cubic yards (yd³) of fill to construct the stability berm and raise the crest height of the dam. Approximately 31,000 yd³ of sand and 29,000 yd³ of gravel would be required for the filter and drain. The berm material would be borrowed onsite, and the gravel and sand would be transported from a commercial source.

Excavation of the foundation key trench and downstream face of the existing embankment would require stockpiling material for later use in the stability berm. Approximately 11 acres of land downstream from the dam would be needed to provide space to construct the key trench and stability berm, stockpile material excavated from the key trench, and accommodate the staging of equipment. A 14-acre portion of the dewatered reservoir would provide fill material to be used in the stability berm. All work areas are within the temporary construction easement shown in Figure 3. The construction easement encompasses approximately 55 acres.

Outlet Works. 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 the new facilities installed. The embankment would be excavated to approximately 5 feet below the existing outlet works with an approximately 25-foot bottom width and 3:1 side slopes. New facilities would consist of an intake structure, a reinforced concrete conduit through the dam lined with a dual-walled, high-density polyethylene (HDPE) pipe, a control structure, a Type VI impact basin, and a riprap-lined outlet channel leading to the existing irrigation canal. The new outlet works conduit would consist of a reinforced concrete conduit with a 42-inch-diameter HDPE containment pipe surrounding a 30-inch-diameter, light-colored HDPE carrier pipe. The new outlet works conduit would be pressurized throughout the dam with regulating gates in the control structure at the downstream end. Maximum computed discharge of the outlet works is 100 cfs.

To-dil-hil Wash Diversion Ditch. Sediment and a small berm presently obstruct the diversion ditch and render this diversion feature inoperable. This material would be removed to restore operation of the diversion.

Reservoir Capacity. The capacity of the reservoir at the spillway elevation would remain unchanged at 806 acre-feet.

2.3 Alternative A - Remove and Replace Dam on Existing Site

Dam Embankment. Under Alternative A, the existing dam would be removed and replaced with a new embankment and outlet works onsite. Embankment material removed from the existing dam, including the toe area and foundation, would be stockpiled and processed for reuse. After the existing dam is removed, a shear key trench would be excavated to bedrock to anchor the new embankment and install seepage protection. A new earth-fill embankment would be constructed over the shear key trench utilizing material salvaged from the old embankment mixed with material extracted from the borrow area described under the Proposed Action. The new embankment would include an 8-foot-wide sand filter, 8-foot-wide gravel drain, geotextile membrane, and new toe drain system utilizing a design similar to the Proposed Action.

The crest height of the dam would be raised 1 foot to elevation 5,676 to obviate the safety deficiency associated with inadequate freeboard. Approximately 330,000 yd³ of fill would be used to raise the height of the embankment and construct the downstream and upstream slopes at 2.5:1 and 4:1 (H:V), respectively. An estimated 41,000 yd³ of sand for the filter and 37,000 yd³ of gravel for the drain also would be required. The upstream embankment would be armored with riprap.

Removal and recycling of embankment material from the existing dam and excavation of the shear key trench would require stockpiling approximately 340,000 yd³ of material. Approximately 16 acres of land immediately downstream of the existing dam alignment would be needed for staging of construction equipment and to stockpile and process excavated embankment and foundation materials. Material borrowed from the lakebed would be mixed with material recycled from the existing dam to construct the new embankment. The portion of the dewatered reservoir affected by construction would be similar to the area described under the Proposed Action. This alternative would require a construction easement encompassing at least 59 acres.

Outlet Works. New facilities consisting of a concrete intake structure; 30-inch-diameter, steel-lined, reinforced-concrete conduit (either pressurized or nonpressurized); concrete gate house at the discharge portal; and Type IV stilling basin would be constructed along the same alignment as the old outlet works. The design of the outlet works would generally be similar to the Proposed Action.

Reservoir Capacity. The capacity at the spillway elevation would remain unchanged at 806 acre-feet. There would be no change to the maximum operating elevation.

2.4 Alternative B – Construct New Dam on Downstream Site

Dam Embankment. Alternative B is similar to the Preferred Alternative identified in the draft EA that was released on August 1, 2008. Under this alternative, the existing dam would be removed and a new dam constructed on an alignment centered approximately 600-feet downstream. The new dam would have an angled configuration with a total

length of 2,600 feet and maximum height of 30 feet above the land surface at the crest elevation of 5,676, with downstream and upstream slopes of 2.5:1 and 3:1 (H:V), respectively. Upstream slope protection would be provided by soil cement or riprap.

During construction, a shear key trench would be excavated to bedrock to provide deep reinforcement of the dam and facilitate installation of the filtered seepage collection system. The minimum width of the shear key at bedrock would be 40 feet. An earth-fill embankment with a 5-foot-wide sand filter, a 5-foot-wide gravel drain, and a piped toe drain system would be constructed over this trench, forming the body of the dam. A geotextile membrane would be placed between the gravel filter and earth-fill material to provide additional filtering capability. This network of filters and drains is designed to safely collect and convey embankment and foundation seepage.

This alternative would require approximately 350,000 yd³ of embankment fill, 26,000 yd³ of sand for the sand filter, and 25,000 yd³ of gravel for the gravel drain. Embankment fill would be obtained from material recycled from the existing dam, material excavated from the shear key trench of the new dam, and possible borrow sites located between the old and new dam alignments. Removal and recycling of embankment material from the existing dam and excavation of the shear key trench for the new dam would require temporary stockpiling of material in the area between the old and new dam alignments. Approximately 22 acres of land downstream from the existing dam would be needed to stockpile and process material for the new embankment and to provide staging of other construction materials and equipment. This alternative would require a construction easement encompassing at least 54 acres.

Outlet Works. The outlet works would consist of an intake structure, a reinforced-concrete conduit equipped with a dual-walled HDPE liner, a valve house, a Type VI stilling basin, and a riprap-lined outlet channel leading to a reinforced-concrete canal.

The concrete intake structure would be approximately 14-feet high with an intake at elevation 5,654. This elevation corresponds to the approximate level of sediments within the existing reservoir basin and the level to which the existing dam would be removed. A 30-inch-square sluice gate with hydraulic control lines would be installed inside the intake structure and would be operated in a fully opened or fully closed position. This gate would be controlled from a metal hoist house (recycled from the existing dam) on the crest of the dam. The existing early warning system and reservoir level sensor would be retained and reused.

The outlet conduit would consist of a pressurized dual-walled HDPE pipe with a 30-inch-diameter carrier pipe within a 42-inch-diameter, concrete-encased carrier pipe. Maximum computed discharge would be approximately 100 cfs. Discharges from the outlet works would be controlled by either a 24-inch, rate-of-flow control valve or a 24-inch ball valve inside a concrete valve house at the downstream toe of the dam. A 24-inch globe valve would be used to control outlet discharges, and a 24-inch ball valve, operated in a fully open or fully closed position, would be used for releasing the maximum discharge. The ball valve would be motor operated with a manual operator

that could be used as backup. Power to operate the ball valve would be provided by a solar-powered battery. An 18-inch steel pipe would be bifurcated from the main conduit to provide tie-in capability for a pressurized irrigation pipeline.

A Type-VI concrete stilling basin would be constructed to reduce flow velocities of discharges from the outlet works. The stilling basin would discharge into a riprapped outlet channel leading to a reinforced concrete canal that would tie into the existing canal that serves the on-farm irrigation distribution system.

Reservoir Capacity. The capacity of the reservoir at the spillway crest elevation would be 1,152 acre-feet.

Alternative B is the most expensive construction option considered to meet the purpose and need for corrective action.

2.6 Comparison of Alternatives

The environmental consequences of the action alternatives and No Action are summarized in Table 1. Additional details are provided in Chapter 3.

Table 1. Comparison of alternatives.

Attribute	No Action	Proposed Action	Alternative A	Alternative B
Reservoir Capacity	0 ¹ (806 acre-feet) ²	806 acre-feet	806 acre-feet	1,152 acre-feet
Outlet Works Capacity	0 ¹ (64 cfs) ²	100 cfs	60 cfs	100 cfs
Safety Considerations	Hazards from embankment instability.	Only high-risk safety deficiencies corrected.	All safety deficiencies corrected.	All safety deficiencies corrected.
Water Resources	Long-term loss of reservoir storage. No impact on Captain Tom Wash.	Resumption of diversions from To-dil-hil and Captain Tom Washes and impoundment of water within the reservoir.	Resumption of diversions from Captain Tom Wash and impoundment of water within the reservoir.	Resumption of diversions and reservoir storage. Minor impact to water supply in lower Captain Tom Wash from increased reservoir storage.
Land Use	Long-term adverse impacts to agriculture and livestock watering.	Return of stored water supply for irrigation and livestock.	Return of stored water supply for irrigation and livestock.	Return of stored water supply for irrigation and livestock.
Soils	No change.	Potential disturbance to 55 acres due to construction. Impacts minimized using best management practices (BMPs).	Potential disturbance to 59 acres due to construction. Impacts minimized using BMPs.	Potential disturbance to 54 acres due to construction. Impacts minimized using BMPs.

Attribute	No Action	Proposed Action	Alternative A	Alternative B
Air Quality	No change.	Minor short-term, intermittent impacts from construction.	Minor short-term, intermittent impacts from construction.	Minor short-term, intermittent impacts from construction.
Biological Resources	No change.	Possible impact to 18 acres of terrestrial habitat due to construction. Long-term impacts reduced to a negligible level by revegetation. Minor displacement of wildlife. No effect to special status species.	Possible impact to 21 acres of terrestrial habitat due to construction. Long-term impacts reduced to a negligible level by revegetation. Minor displacement of wildlife. No effect to special status species.	Possible impact to 34 acres of terrestrial habitat due to construction and inundation. Long-term impacts reduced to a negligible level by revegetation. Minor displacement of wildlife. No effect to special status species.
Cultural Resources	No change.	No effect. Cultural resource sites avoided.	No effect. Cultural resource sites avoided.	Cultural material at two sites would be damaged or lost. Data recovery implemented to mitigate for losses.
Environmental Justice/Socio-economic Considerations	Long-term adverse impact to agricultural productivity.	Return of stored water supply for irrigation and livestock watering and improved agricultural productivity.	Return of stored water supply for irrigation and livestock watering and improved agricultural productivity.	Return of stored water supply for irrigation and livestock watering and improved agricultural productivity.
Indian Trust Assets	Long-term loss of stored water supply due to permanent dewatering of reservoir.	Resumption of water storage for irrigation and livestock. Beneficial use of water right.	Resumption of water storage for irrigation and livestock. Beneficial use of water right.	Return of stored water supply for irrigation and livestock. Beneficial use of water right.

¹ SOD operating restriction.

² Normal operating levels.

CHAPTER 3 - AFFECTED ENVIRONMENT AND 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

Captain Tom Reservoir is an off-stream impoundment of Captain Tom Wash with a storage capacity of 806 acre-feet (90 surface acres) at the spillway crest elevation of 5,672.2 feet. Sedimentation has reduced the maximum storage pool depth at the inlet structure by approximately 6 feet. Under normal conditions, basic operation involves filling the reservoir with diverted stream flow and releasing water through the outlet works to meet the irrigation needs of downstream Navajo farmers. A concrete diversion structure with a gated, unlined ditch directs flow from Captain Tom Wash into a natural drainage that discharges into the reservoir. Local storm runoff from a 3.4-square-mile watershed also contributes minor amounts of water. Captain Tom Dam is not currently storing water due to SOD restrictions.

Captain Tom Wash is a tributary to the Chaco River, which converges with the San Juan River near Shiprock, New Mexico. The headwaters of Captain Tom Wash originate in the Chuska Mountains at an elevation of 9,100 feet approximately 15 miles southwest of the reservoir. Portions of Captain Tom Wash are perennial near the headwaters. Wash discharges are influenced by a snowmelt hydrograph that produces flows in late winter and spring and monsoon storms that generate sporadic flows in late summer. Minimal to no flow is common in late spring through mid-summer, late fall, and early winter. August provides the maximum rainfall values for a general storm event, and February and March provide the highest values for snowmelt. The highest and lowest monthly mean discharges recorded by the NNDWR in 2006 were 6.76 cfs (March) and 0.002 cfs (July), respectively. In 2006, the highest daily discharge was 42 cfs (March); flows were recorded on 222 days. Estimated peak and daily maximum flows at the Captain Tom Wash diversion are shown in Table 2 (Reclamation 2005b).

Table 2. Estimated peak and daily maximum flows at Captain Tom Wash diversion.

Frequency (years)	Peak Flow (cfs)	Max. 1-Day Avg (cfs)
2	459	43
5	1,030	157
10	1,600	294
25	2,450	553
50	3,300	814
100	4,310	1,138

Flows were historically diverted both from Captain Tom and To-dil-hil Washes. However, the diversion ditch from To-dil-hil Wash is clogged with sediment and

obstructed by a small dike; consequently, this ditch has not supplied water to the reservoir for several years. Farmers continue to locally divert water from Captain Tom and To-dil-hil Washes into irrigation ditches east of the dam.

In past years, reservoir seepage through embankment and foundation material supported minor ponding, moist soils, and wetland vegetation along the downstream toe of the dam. However, the reservoir was substantially drawn down in 2003 and totally dewatered in 2004 which resulted in cessation of foundation seepage, desiccation of soils, and substantial loss of wetland conditions.

No Action

If no action is taken, SOD restrictions would preclude refilling the reservoir, and no water would be diverted from Captain Tom and To-dil-hil Washes. The reservoir would remain dry into the foreseeable future. The small, remnant wetland at the toe of the dam would likely disappear.

Proposed Action

The U.S. Army Corps of Engineers (COE) regulates discharges of fill material to waters of the U.S., 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 U.S. 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. Ground disturbances in jurisdictional waters would be restricted to portions of the dewatered reservoir basin where borrow activities and modification of the existing dam would occur and to a remnant (0.2 acre) and sparsely populated rush (*Juncus* spp.) wetland at the downstream toe of the dam. To-dil-hil and Captain Tom Washes would not be affected during construction, although the diversion ditch from To-dil-hil Wash would be cleared of obstructions and reopened. After construction, diversion of flows from Captain Tom and To-dil-hil Washes into the reservoir would resume. The rate at which the reservoir returns to normal operating levels would be influenced by the amount of runoff from snow melt and monsoon storms. Storage capacity of the reservoir at the spillway crest elevation would not change.

Alternative A

Under Alternative A, ground disturbances in jurisdictional waters would be restricted to portions of the dewatered reservoir basin where borrow activities and excavation and replacement of the existing embankment would occur. The remnant *Juncus* wetland at the downstream toe of the dam would be destroyed during construction. To-dil-hil and Captain Tom Washes would not be affected. Refilling the reservoir would be dependent on the availability of flow in Captain Tom Wash. The maximum operating elevation and storage capacity of the reservoir would not change.

Alternative B

Under Alternative B, storage capacity of the reservoir at the spillway crest elevation would be 1,152 acre-feet (110 surface acres), which represents a 43% increase. The retention of additional water in the expanded reservoir would represent water that otherwise would flow past the diversion in Captain Tom Wash toward the Chaco River. The potential indirect effect of this additional storage would be to reduce the amount of water available to Captain Tom Wash downstream of the diversion. In years with less than average runoff from snowmelt or monsoon storms, the additional reservoir storage capacity would be underutilized due to the paucity of flows that could be diverted. More storage would occur in years with above-average runoff. Retention of water at or near the maximum storage capacity has been documented on few occasions during the operating history of the reservoir, and this low frequency of occurrence would likely be repeated in the foreseeable future.² The effect of expanded reservoir storage on flows in lower Captain Tom Wash would be minor. Expansion of the reservoir would inundate the *Juncus* wetland, resulting in its loss.

Cumulative Effects

Renewed diversion of flows from Captain Tom and To-dil-hil Washes would improve the reliability of water supplies for irrigation and livestock watering.

Mitigation Requirements

- BMPs would be developed and employed by the contractor to control storm-water runoff from the construction site.
- The contractor would prepare a storm-water pollution prevention plan in accordance with National Pollutant Discharge Elimination System requirements.

3.2 Land Use

3.2.1 Affected Environment

Captain Tom Dam is located within the Toadlena/Two Grey Hills Chapter of the Navajo Nation. However, most of the farmland that receives supplies of irrigation water from the dam is located within the Newcomb Chapter. The predominant land use in the area consists of open range for livestock grazing, farming, and scattered residences.

Approximately 102 farm plots representing 700 acres of fallow and active farmland occupy a block of land that begins ¼-mile southeast of the dam and extends approximately 3 miles to the east (Figure 4). Under normal operating conditions, irrigation water is supplied to these plots through a complex of earthen ditches connected

² Heavy runoff contributed to an unusually high reservoir level in May and June 1995. The reservoir had reportedly been within inches of the spillway crest, representing one of the few occasions when the reservoir was near maximum operating capacity.

to a concrete-lined ditch from Captain Tom Dam and by local diversions of Captain Tom and To-dil-hil Washes. Crops typically grown in the area include alfalfa, corn, and assorted vegetables. Farm residences are dispersed throughout the agricultural area. There are no lands within the project area that meet the criteria for designation as prime or unique farmland.

The existing SOD operating restrictions have disrupted normal cultivation patterns and practices. Farmers on less than half of the 102 farm plots have attempted limited cultivation with water that is sporadically captured at local diversions of Captain Tom and To-dil-hil Washes. The remaining farm plots have been retired until SOD deficiencies are corrected and irrigation releases from Captain Tom Dam are restored.

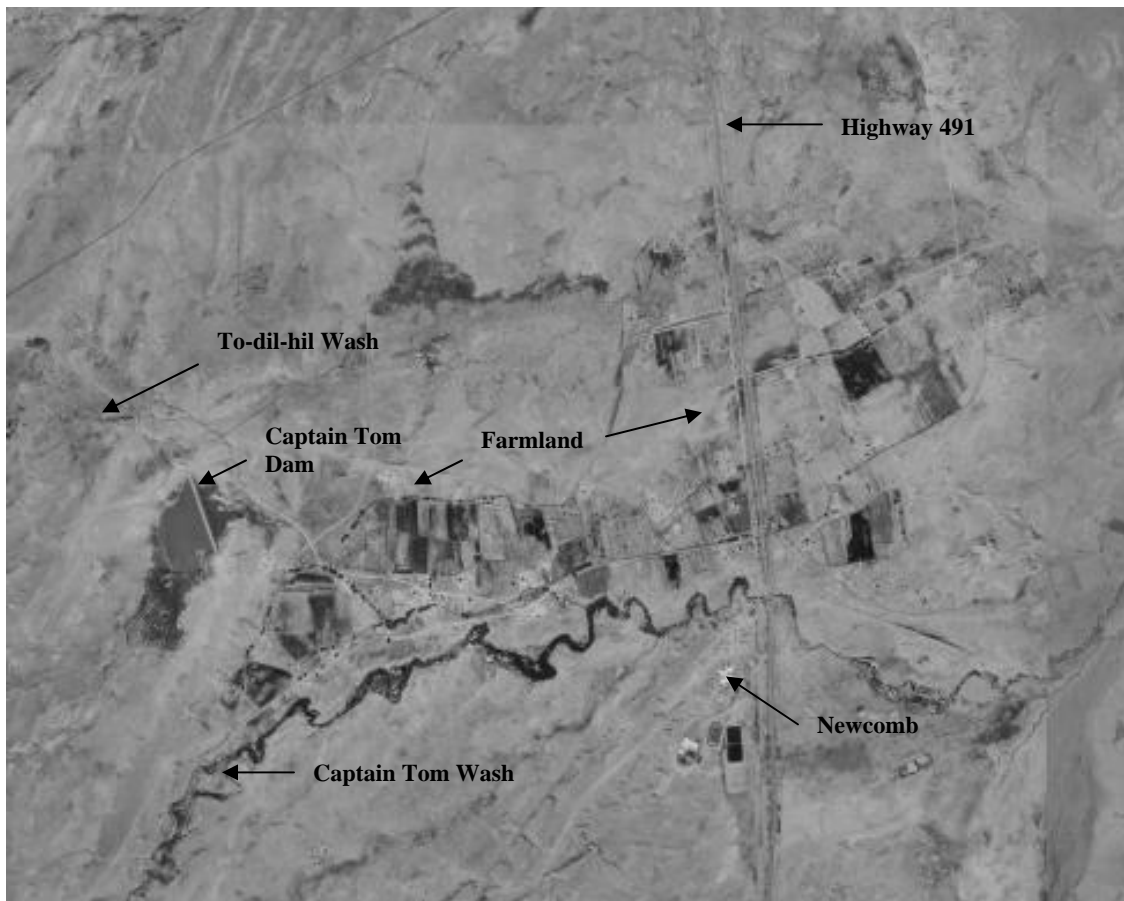


Figure 4. Land features near Captain Tom Dam.

3.2.2 Environmental Consequences

No Action

Permanent loss of the reservoir would eliminate a significant and relatively reliable source of water available to area farmers. Without water supplied from the dam, irrigation and livestock watering would be dependent on the capture of sporadic flows via on-farm diversions of Captain Tom and To-dil-hil Washes. Crop production would be

constrained by the irregular and unpredictable supply of water, resulting in lower crop yields and possible permanent abandonment of numerous fields.

Proposed Action

The temporary construction easement would encompass approximately 55 acres of Navajo Nation tribal land. Areas of active construction would be reserved for contractor use and unavailable to the public. Restrictions on access during construction are necessary to ensure public safety and welfare. Construction would not adversely affect farmland or ongoing farm operations. The footprint of the modified dam would permanently remove approximately 1.8 acres of land along the downstream toe of the embankment that was formerly grazed by range cattle.

The long-term effect of the project would be to restore operation of the dam and improve the reliability of water supplies for irrigation and livestock watering. Much of the farmland that is currently fallow or sporadically cultivated would be returned to active production. Land use within the farmed area would approximate the pre-2004 pattern of irrigated and fallow agricultural fields. Future water storage would be confined to the existing reservoir basin.

Alternative A

Under Alternative A, the effect on land uses would be similar to those described for the Proposed Action. The construction easement would encompass a slightly larger area than is required under the Proposed Action and would include areas needed for stockpiling recycled embankment material derived from deconstruction of the existing dam and staging of other materials and equipment used in construction. Future water storage would be confined to the existing reservoir.

Alternative B

Under Alternative B, the construction easement would encompass a substantially larger area outside of the existing reservoir than is required under the Proposed Action or Alternative A and would include nearly 58 acres for deconstruction of the existing dam, extraction of borrow material, and construction of the new dam. Once operation is restored, the reservoir at the spillway crest elevation would inundate an additional 20 acres of tribally owned land and result in greater loss of land that was formerly open to livestock grazing.

Cumulative Effects

The ongoing regional drought and unpredictable water supply have limited agricultural productivity of the adjoining farm fields. Restoration of water storage behind Captain Tom Dam would create renewed farm activity and provide opportunities to return fallow land to active production.

Mitigation Requirements

No mitigation is recommended.

3.3 Geology and Soils

3.3.1 Affected Environment

Captain Tom Dam is located in the San Juan Basin of the Colorado Plateau. Sandstone of the Cretaceous Menefee Formation constitutes bedrock at the reservoir and forms the foundation of the upper right and left abutments of the dam. The majority of the dam foundation consists of unconsolidated alluvial deposits. These deposits consist of stratified silty sand and sandy clay, with occasional clayey sand and poorly graded sand with silt layers. Recent deposits composed primarily of wind-blown silt blanket the upper slopes and ridges surrounding the dam and reservoir. The reservoir basin is partially filled with lakebed sediments transported in the flows diverted from Captain Tom Wash. Approximately 6 feet of lakebed deposits fill the basin at the inlet structure to the dam.

Soils in the low topographic trough immediately downstream of the dam belong to the Jeddito-Escavada Association (Natural Resources Conservation Service [NCRS] undated report). These alluvial soils, which are derived from sandstone and shale, are typically found on valley floors and consist mostly of loamy fine sand and similar materials. Although soils belonging to this association have slow runoff potential and a slight hazard of water erosion, the propensity for wind erosion is very severe.

Upland soils belong to the Farb-Rock outcrop-Badland complex (NRCS undated report). Land substrates consist primarily of loamy fine sand and silt, rock outcrops, and intrusions. Soil depth tends to be very shallow, with a rapid runoff potential, moderate water erosion hazard, and severe wind erosion hazard.

Soil conditions in the project area are also affected by differences in topographic relief and livestock grazing. Historic overgrazing on upland slopes and lowland areas downstream of the dam has reduced ground cover and likely accelerated natural rates of wind and water erosion.

3.3.2 Environmental Consequences

No Action

Existing soil conditions would likely persist into the foreseeable future.

Proposed Action

Under the Proposed Action, construction would include excavation of a shear key trench along the downstream toe of the existing embankment, stockpiling excavated material for

reuse, construction of the stability berm, raising the crest height of the dam, and constructing a new outlet works. Material processing and stockpiling would occur in the area immediately downstream of the dam. Extraction of borrow material would affect portions of the dewatered reservoir. Construction would affect approximately 42 acres of alluvial soils in the area immediately downstream of the dam (11 acres) and within the dewatered reservoir (30 acres). Approximately 6.5 acres of upland soils would be impacted adjacent to the abutments of the dam and along the To-dil-hil Wash diversion ditch. Following construction, approximately 69 percent (38 acres) of the impacted area would be within the footprint of the modified dam and existing reservoir.

Alternative A

Under Alternative A, construction would include removal of the existing embankment, excavation of a shear key trench, and stockpiling material for reuse in the reconstructed dam. Additional embankment material would be extracted from possible borrow sites in the dewatered reservoir. Embankment deconstruction, borrow material extraction, material stockpiling and processing, and equipment use would affect approximately 58 acres of alluvial soils consisting of the excavated foundation of the existing dam, portions of the dewatered reservoir, and downstream staging area. Approximately 5 acres of upland soils would be impacted adjacent to the abutments of the dam. Following construction, approximately 64 percent (38 acres) of the impacted area would be within the footprint of the reconstructed dam and existing reservoir basin.

Alternative B

Under Alternative B, construction would include removal of the existing embankment, excavation of a shear key trench along the alignment of the new dam, and stockpiling material for reuse in the new dam. Additional embankment material would be extracted from possible borrow sites between the new and old dam alignments. Material excavation, stockpiling, and equipment use would impact approximately 42 acres of alluvial soils and 12 acres of upland soils between and adjacent to the old and new dam alignments. Following construction, approximately 81 percent (44 acres) of the impacted area would be within the footprint of the new dam and expanded reservoir.

Cumulative Effects

The potential construction impact area was substantially modified during construction of Captain Tom Dam and the To-dil-hil Wash diversion in 1937. Subsequent tramping and grazing by livestock has had a repeated effect on soil conditions. Anticipated soil disturbances resulting from the proposed project would be incremental to these past and present impacts. Implementation of appropriated mitigation measures would minimize the cumulative effect of the proposed project on soils.

Mitigation Requirements

- Existing roads would be used for construction haulage to the fullest extent

practicable.

- No stockpiles of material would remain following project completion.
- Construction equipment would be routinely inspected for leaks and other deficiencies that could cause spillage of petroleum products onto the ground. Substantial leaks would be promptly corrected.
- Petroleum products would be stored in a designated portion of the contractor yard. Lined secondary containment would be required for petroleum storage.
- Spills and disposal of contaminated media would be managed in accordance with Federal and tribal guidelines.
- 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, mulch, or sediment basins.
- Where appropriate, construction-impacted soils outside the reservoir basin would be reseeded to reestablish vegetative cover.
- The new dam embankment would be fenced to prevent encroachment by livestock and to protect soils.

3.4 Biological Resources

The project area is located along the eastern foothills of the Chuska Mountains. Lands encompassing this area are characterized by wash-dissected rolling hills which support a spartan saltbush community. Wind erosion and overgrazing by livestock has historically played a significant role in degrading this habitat type.

The results of inventories conducted in the June 2006, March 2007, and August 2008 are summarized below. These inventories were completed from available data and field surveys of the project area.

3.4.1 Affected Environment

Vegetation – The project area is located in the Plains and Great Basin Grassland on the approximate ecotone with Great Basin Desertscrub (Brown 1994; Brown and Lowe 1980). The upland plant community consists of shadscale (*Atriplex confertifolia*), fourwing saltbush (*A. canescens*), greasewood (*Sarcobatus* sp.), with scattered rabbitbrush (*Chrysothamnus* spp.) and snakeweed (*Gutierrezia* sp.). Herbaceous vegetation is sparse. Plant cover is less than 20 percent on most sites.

Riparian vegetation consists of nonnative tamarisk (*Tamarix ramosissima*) and cottonwood (*Populus fremontii*). Scattered stands of tamarisk (crown height generally

less than 12 feet) occur along the upper margins of the dewatered reservoir and near the downstream toe of the dam. A formerly robust stand of cottonwood located along the upper portion of the reservoir has significantly declined in response to dewatering.

Wetlands – Prior to 2004, lake seepage through embankment and foundation material artificially sustained wetland conditions near the downstream toe of the dam. Draining the reservoir has eliminated this water supply and caused the disappearance of hydrologic conditions that supported the wetland. Only a narrow and sparsely populated stringer of *Juncus* (spp.) persists along the downstream toe of the dam.

Fisheries and Aquatic Habitats – There are no fisheries or aquatic habitats in the project area. Captain Tom Reservoir was substantially drawn down in 2003 and completely drained in 2004. No impoundment of water has occurred since 2004 other than infrequent, minor ponding of local storm runoff. There are no perennial streams or seeps in the area. Operation of the dam and reservoir has been solely to supply water for irrigation and livestock. According to the Navajo Nation Fish and Wildlife Department (NNFWD), the reservoir has not supported a fishery in the past due to significant drawdown and low-water levels that often occur by the end of the irrigation season.

Wildlife – Sixty-eight mammal species have been recorded in San Juan County (<http://www.bison-m.org>). Characteristic mammals of shadscale-fourwing saltbrush habitat in northwestern New Mexico include coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), and Ord's kangaroo rat (*Dipodomys ordi*).

Bird surveys in San Juan County have recorded a total of 269 species (<http://www.bison-m.org>), with 120 species listed as nesting (U.S. Geological Survey [USGS] 2006). Habitat diversity within San Juan County is high, ranging from Great Basin Desertscrub near the foothills, to mixed conifer communities in the Chuska Mountains, and riparian communities along perennial streams and rivers. Of these habitat types, avian diversity and density are typically lowest in desert shrub communities (Wiens and Rotenberry 1981). This is most likely due to the structural and floristic simplicity of cold desert shrub habitat (Rotenberry 1985, Wiens and Rotenberry 1981). Species that are typical in non-sagebrush shrub associations in northern New Mexico include black-throated sparrow (*Amphispiza bilineata*), vesper sparrow (*Pooecetes gramineus*), lark sparrow (*Chondestes grammacus*), and the ubiquitous common raven (*Corvus corax*) and American crow (*C. brachyrhynchos*).

Twenty-three reptile species have been recorded in the county (<http://www.bison-m.org>). Locally common reptiles of northwestern New Mexico include the prairie rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis catenifer*), greater short-horned lizard (*Phrynosoma hernandesi*), plateau striped whiptail (*Aspidoscelis velox*), common side-blotched lizard (*Uta stansburiana*), and plateau lizard (*Sceloporus tristichus*).

Special Status Species - Table 3 and the following discussion are based on the analysis of endangered, threatened, and candidate species included on the FWS San Juan County list

and the Navajo Nation list of special status species that may occur in the portion of the county covered by the Newcomb, New Mexico, and Tsin-Nas-Kid, New Mexico, 7.5-minute series USGS quadrangle maps. The potential for species occurrence was determined on quadrangle-wide coarse habitat characteristics and species range information provided by the NNFWD. The FWS lists two additional species that potentially occur in San Juan County but are not included in Table 3. The absence of perennial surface water in the project area precludes the occurrence of Colorado pikeminnow (*Ptychocheilus lucius*) and razorback sucker (*Xyrauchen texanus*).

Table 3. Navajo Nation and federally listed endangered, threatened, and candidate species.¹

Species		Habitat Type	Status		Potential Occurrence
Common Name	Scientific Name		Federal	Navajo	
Black-footed ferret	<i>Mustela nigripes</i>	Associated with prairie dog towns in desert grasslands	E	Group 2	Prairie dog towns absent, no occurrence
Pronghorn antelope	<i>Antilocapra americana</i>	Grasslands, sagebrush, or desert scrub with a high percentage of grasses on rolling or dissected hills; casual use in Great Basin rabbitbrush/shadscale habitat		Group 3	Grasses sparse, potential habitat marginal; no signs of species noted in field survey; occurrence unlikely
Bald eagle	<i>Haliaeetus leucocephalus</i>	Large trees or cliffs near water (lakes, rivers, and streams) with abundant prey. Uncommon in San Juan County		Group 2	Nesting and foraging habitat absent; no occurrence
Ferruginous hawk	<i>Buteo regalis</i>	Occur casually in open grasslands and pinyon-juniper mesas in northern New Mexico. Uncommon in San Juan County		Group 3	Nesting habitat absent; dispersed foraging along foothills possible
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Nests and roosts in mixed conifer forests and steep-walled, narrow canyons with riparian vegetation and cool microclimates	T	Group 3	Nesting and foraging habitat absent; no occurrence
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries)	C	Group 2	Tamarisk and cottonwood community scattered, not suitable habitat; no occurrence

Species		Habitat Type	Status		Potential Occurrence
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Riparian sites with dense cottonwood, willow, or tamarisk	E	Group 2	Tamarisk and cottonwood community scattered, no standing water or moist soils, not suitable habitat; no occurrence
Mountain plover	<i>Charadrius montanus</i>	Dry upland grasslands, plowed fields, and sandy desert		Group 4	Grassland and other suitable habitat absent; occurrence unlikely
Northern leopard frog	<i>Rana pipiens</i>	Streams and wetlands that support aquatic vegetation, also in wet meadows		Group 2	Aquatic and wet meadow habitat absent; no occurrence
Knowlton cactus	<i>Pediocactus knowltonii</i>	Occurs on tertiary alluvial deposits on the San Jose formation within open pinyon-juniper woodlands; elevation 6,400 to 7,200 feet	E		Suitable ecological and edaphic conditions absent; no occurrence
Mancos milk vetch	<i>Astragalus humillimus</i>	Occurs in cracks or eroded depressions on sandstone rimrock ledges and mesa tops in Point Lookout sandstone	E	Group 2	Suitable ecological and edaphic conditions absent; no occurrence
Mesa Verde cactus	<i>Sclerocactus mesae-verdae</i>	Restricted to xeric clay soils derived from shales and mudstone of alkaline, marine formations on low rolling hills; closest documented population occurs at Sheep Springs approximately 10 miles south of project area	T	Group 2	Project area surveyed; no occurrence

¹ Source: NNFWD 2004, Mikesic et al. 2005, and FWS county list at <http://www.fws.gov/es/southwest/newmexico/>.

² Federal = Endangered Species Act, species listed by FWS: E = endangered; T = threatened; Exp = experimental.

³ Navajo = Navajo Nation Endangered Species List, September 2008 (refers to status on Navajo Nation): Group 1 = no longer occur on the Navajo Nation; Group 2 = Endangered – a species or subspecies whose prospects of survival are in jeopardy; Group 3 = Endangered - a species or subspecies whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future; Group 4 = insufficient information on status of species or subspecies for listing as endangered.

In addition to the species listed in Table 3, the FWS has identified 13 species of concern that may occur in San Juan County. Species of concern are suspected by the FWS, State

of New Mexico, or other agencies to be vulnerable and require further study to determine their conservation status, or are considered sensitive, rare, or declining. These species are listed in Table 4.

Table 4. Species of concern in San Juan County.

Species		Habitat Type
Common Name	Scientific Name	
New Mexico silverspot butterfly	<i>Speyeria nokomis nitocris</i>	Inhabits wet areas in or along moist meadows, seeps, and streams.
San Juan checkerspot butterfly	<i>Euphydryas anicia chuskae</i>	Inhabits moist areas along streams and marshes.
American peregrine falcon	<i>Falco peregrinus anatum</i>	Nests on steep cliffs typically near extensive wetland or forest habitat.
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>	Breeds on Arctic tundra and migrates to wintering areas along Gulf Coast of U.S. to South America; periodically is observed in New Mexico during spring and fall migration.
Baird's sparrow	<i>Ammodramus bairdii</i>	Breeds and winters in grasslands.
Black tern	<i>Chlidonias niger</i>	Inhabits freshwater marshes.
Mountain plover	<i>Charadrius montanus</i>	Nests in flat to slightly rolling expanses of grasslands, semi-desert, badlands, and occasionally in cultivated fields.
Northern goshawk	<i>Accipiter gentilis</i>	Inhabits forested areas.
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	Nests in deserted mammal burrows (often in prairie dog burrows) in dry open grasslands or desertscrub; availability of suitable burrows is critical.
Roundtail chub	<i>Gilia formosa</i>	Permanent cool to warm water mid-elevation streams.
Bisti fleabane	<i>Erigeron bistiensis</i>	Restricted to Chinle Formation shale on selenium-bearing soils; typically found on steep, barren slopes in pinyon-juniper woodland or desertscrub.
Brack's fishhook cactus	<i>Sclerocactus cloveriae ssp. Brackii</i>	Sandy clay strata of the Nacimiento Formation in sparse shadscale scrub; known from limited areas on both sides of the San Juan River valley.
Parish's alkali grass	<i>Puccinellia parishii</i>	Alkaline seeps, springs, and seasonally wet areas.

Source: FWS Web site <http://www.fws.gov/es/southwest/newmexico/>.

3.4.2 Environmental Consequences

No Action

Vegetation - The cottonwood community would continue to decline in response to loss of the reservoir. Permanent dewatering would create an opportunity for invasive weeds to become established on sediments in the dry reservoir basin. The *Juncus* wetland would likely disappear within the next few years due to desiccation of the site.

Wildlife - Permanent dewatering would have a minor effect on avifauna. Numerous other lakes and ponds in the Chuska Mountains and major perennial rivers such as the San Juan are regionally available to waterfowl and other migratory birds.

Special Status Species - Permanent dewatering would not affect special status species.

Proposed Action

Vegetation – Approximately 6.5 acres of shadscale/fourwing saltbush habitat would be directly or indirectly affected by construction near the abutments of the dam and along the To-dil-hil Wash diversion ditch.

Implementation of the Proposed Action would directly or indirectly affect 11 acres of vegetated lowland habitat, consisting of heavily grazed, nonnative grasses and scattered tamarisk downstream of the existing dam. This area also includes a sparse stringer of *Juncus* (spp.) on approximately 0.2 acre on dry surface soils along the downstream toe of the dam. The cottonwood/tamarisk riparian community along the upper margins of the reservoir would improve once water storage resumes.

Approximately 38 acres within the construction easement consist of the dry reservoir basin and slopes of the existing dam.

Project effects on native vegetation would be reduced to the maximum extent practicable by using existing roads for construction haulage. Previously disturbed sites, such as the area immediately downstream of the dam, would be used for construction staging, material, and stockpiling. Following construction, affected areas would be rehabilitated as appropriate. Direct and indirect effects of construction on native vegetation would be minor.

Wildlife – There would be localized displacement of wildlife during construction. Within the project area, construction activity and noise may disrupt foraging and reproductive behavior of avian and mammalian species. Overall impact on avifauna would be low because of the availability of alternate foraging and nesting habitat in adjoining areas. Potential effects on avian reproduction would be minimized by conducting all required vegetation removal during the non-breeding season (i.e., fall and winter). Injury and death of smaller and less mobile animals such as rodents and reptiles could result from equipment use and earth-moving activities. The loss of 6.5 acres of shadscale/saltbush desertscrub represents a minor impact due to the abundance of similar habitat in the region. The loss of lowland habitat below the dam would be offset by long-term improvement of riparian conditions along the upper margins of the reservoir.

Restoration of the reservoir would provide limited benefit to resident and migratory avifauna and other wildlife. The NNFWD does not plan to stock the reservoir with fish.

Special Status Species – Of the 15 federally and Navajo-protected species listed in Table 3, only the Mesa Verde cactus has the potential to occur within the project area. Surveys for Mesa Verde cactus were negative. No suitable nesting habitat for any of the seven special status bird species would be affected by the project. Range conditions are marginal for pronghorn. No impact to federally or Navajo-listed species is anticipated.

There are no suitable edaphic conditions or habitat within the project area for the species of concern listed in Table 4. The project would have no effect on population numbers or trends of these species.

Alternative A

Under Alternative A, the potential biological resource impacts would be similar to those described for the Proposed Action. This alternative would directly or indirectly affect approximately 5 acres of shadscale/fourwing saltbush habitat and 16 acres of vegetated lowland habitat.

The potential impact to special status species would be the same as the Proposed Action.

Alternative B

Under Alternative B, the potential biological resource impacts would be similar to those described for the Proposed Action. This alternative would directly or indirectly affect approximately 12 acres of shadscale/fourwing saltbush habitat and 22 acres of vegetated lowland habitat.

The potential impact to special status species would be the same as the Proposed Alternative.

Cumulative Effects

The combined effects of prolonged drought, historic overgrazing, and recent loss of stored water have affected plant communities in the project area. Implementation of the SOD project would result in the permanent loss of tamarisk in the downstream toe area, although tamarisk and cottonwood that persist in the upper margins of the reservoir would benefit from resumption of water storage. Any vegetation that is disturbed by construction on upland sites would recover slowly due to low annual precipitation and the susceptibility of destabilized soils to wind erosion. Loss of habitat to construction would be incremental to other land disturbances in the region that convert or fragment habitat, such as road development, oil and gas exploration and production, and grazing pressure.

Mitigation Requirements

- Where appropriate, site restoration consisting of recontouring and seeding would be performed on disturbed sites. A native seed mix approved by the Navajo Nation would be used for reseeding purposes. Seeding of disturbed sites and post-project monitoring of revegetation success would be performed by the NNDWR to ensure conformance with tribal requirements.
- Existing roads would be used for construction haulage to the maximum extent practicable.
- Vegetation clearing would occur after September 1 to avoid impacts to nesting avifauna.

3.5 Cultural Resources

3.5.1 Affected Environment

The area around Captain Tom Dam is rich in prehistoric and historic cultural resources. At least until the middle of the nineteenth century, it was also a productive agricultural area. Prehistoric Anasazi farm fields have been documented along Captain Tom Wash, and U.S. Army expeditions in the 1850s and 1860s noted the abundant Navajo fields in the area. During the eleventh and twelfth centuries, water from Captain Tom Wash irrigated extensive fields that supplied corn and other staples for the occupants of Chaco Canyon some 40 miles to the east. Several Chacoan outlier pueblos and numerous other Anasazi sites can be found in the region surrounding the dam. Navajo farmers realized the agricultural potential of the area, and historic and more recent evidence of their occupation can also be found. Typical cultural resources in the area include petroglyph sites, agricultural sites, resource procurement and processing sites, and a variety of habitation sites, from small single- and multiple-room masonry surface structures, larger masonry pueblos, and historic Navajo and Anglo-European structures and features.

In 2005, 2007, and 2008, Reclamation completed four Class III (intensive) cultural resource surveys encompassing more than 40 acres. One previously recorded site, NM-H-46-66, and one new site (Field Number CTD #1) were located during the surveys. The former site contains several prehistoric petroglyphs, while the latter site is located on a small hill downstream of the dam. It consists of four surface features and a light scatter of prehistoric ceramics and ground and chipped stone. Both sites were determined to be eligible for the National Register of Historic Places.

Reclamation also identified an historic human burial site near the project area. This site would be excluded from the project boundary and avoided during construction. A second site reported to contain an historic human burial was surveyed with ground-penetrating radar. No human remains were found at this additional site.

3.5.2 Environmental Consequences

No Action

Under no action, there would be no impact to significant cultural resources.

Proposed Action

Under the Proposed Action, there would be no impact to significant cultural resources (see mitigation). Reclamation consulted with the Navajo Nation through its Historic Preservation Department (NNHPD) and other Native American Indian Tribes that have possible cultural affinities or other interests in the project area. The NNHPD concurred with Reclamation's no effect determination in October 2008 (see Appendix C). No areas of traditional cultural importance or areas of specific tribal concern have been identified.

Alternative A

Under Alternative A, the impact to significant cultural resources, areas of traditional cultural importance, or areas of specific tribal concern would be similar to the Proposed Action.

Alternative B

Under Alternative B, construction of the new dam and inundation of the expanded reservoir pool would damage or result in the loss of cultural material at NM-H-46-66 and CTD#1. Prior to September 2008, this alternative was considered by the lead and cooperating agencies to be the preferred action. Therefore, as mitigation for these possible effects, a data recovery plan was prepared by Reclamation's consultant, Archaeological Consulting Services (ACS), Inc., and approved by the NNHPD. Field work was conducted under NNHPD Class C Cultural Resources permit (No. C0722) and an Archaeological Resource Protection Act (ARPA) permit (No. NRO-ARPA-07-007) issued November 1, 2007. Data recovery at CTD#1 and NM-H-46-66 recovered all available data from these sites. ACS submitted a final report (Punzmann et al. 2008) to Reclamation on March 20, 2008. A copy of the report was delivered to the NNHPD for review on April 9, 2008, initiating Section 106 consultation for review and comment on the report. NNHPD did not respond within the 30-day review period, indicating acceptance of the report and completion of Section 106 consultation for this project.

The material collected during the data recovery project is stored at the Huhugam Heritage Center (HHC) on the Gila River Indian Reservation at the request of the NNHPD. The HHC is Reclamation's repository and is managed by the Gila River Indian Community through an agreement with Reclamation.

Cumulative Effects

There would be no cumulative impacts on significant cultural resources.

Mitigation Requirements

- Site NM-H-46-66 and the remains of a hogan associated with a potential human burial site would be fenced and avoided during construction.

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. The Environmental Protection Agency (EPA) has promulgated National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide, nitrogen dioxide, particulate matter (PM₁₀ and PM_{2.5}), ozone, sulfur dioxide,

and lead. San Juan County is in attainment of standards for all criteria pollutants. Air quality in western San Juan County is considered good. The New Mexico Environmental Department has measured elevated concentrations of ozone at two monitoring stations near Farmington in the eastern part of the county, approximately 45 miles northeast of Captain Tom Dam.

The Clean Air Act (CAA) provides special protection for visibility and other air quality values in specially designated Class I 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 I under Section 162(a) of the CAA. There are no Class I areas near the project area.

The project area lies along the eastern foothills of the Chuska Mountains at an approximate elevation of 5,650 feet. Rainfall averages 6 inches annually. On a regional scale, low rainfall and periodic high winds contribute to temporary increases in the levels of atmospheric dust. Agricultural activity east of the project area and local unpaved roads are a minor source of localized fugitive dust.

Farm residences that are dispersed throughout the agricultural area to the east and southeast of Captain Tom Dam are potential receptors of fugitive dust from construction associated with the proposed project.

3.6.2 Environmental Consequences

No Action

No major changes in human activities are expected in the project area that would contribute to long-term changes in air quality. Permanent dewatering would expose fine sediments in the reservoir basin to wind erosion and contribute minor amounts of atmospheric dust.

Proposed Action

During construction, heavy-equipment operation would produce tailpipe emissions and air-borne, fine particulate matter from ground disturbances. Primary sources of fugitive dust would include earth moving associated with material borrowing and stockpiling, embankment construction, and grading land surfaces. Dust would also be generated by construction traffic using haul roads within the project area and local unpaved public roads. BIA Road 191 would be used for construction haulage between the project area and Highway 491 to avoid or minimize fugitive dust effects to residences within the farm area. Soils that become destabilized by construction would likely become a passive source of wind-blown dust until stabilization efforts can be implemented. These impacts would be temporary and highly localized. There would be no long-term, adverse impact to air quality from implementation of the Proposed Action.

Alternative A

Under Alternative A, sources of air pollution would be similar to those described for the Proposed Action.

Alternative B

Under Alternative B, sources of air pollution would be similar to those described for the Proposed Action.

Cumulative Effects

Emissions from implementation activities would be incremental to other sources of air pollution within the regional airshed. The cumulative effects of the proposed project on air quality would be minor.

Mitigation Requirements

- Implement standard air-borne dust abatement practices during construction.
- Maintain adequate soil moisture on unpaved haul roads to minimize visible dust emissions.
- Halt earth-moving activities 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 Road 191 would be used for construction haulage between Highway 491 and the project area.

3.7 Hazardous Material and Solid Waste

3.7.1 Affected Environment

The project area encompasses the former lake basin, existing dam, and undeveloped tribal land. No sites contaminated with hazardous or nonhazardous solid wastes are known to occur within the area potentially affected by the project, as reported by the EPA (<http://www.epa.gov/enviro/wme/>). Use, storage, and disposal of hazardous materials³ 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

³ Hazardous materials are defined by Federal Standard No. 313 and 29 CFR 1910.1200.

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

Existing conditions would prevail into the foreseeable future.

Proposed Action

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 occurs, lubricants and fuels 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 disposed of by a contractor 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 waste⁴ 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 disposed of by removal from the work area to an approved disposal facility.

Alternative A

Under Alternative A, the potential impacts attributable to hazardous material use would be similar to those described for the Proposed Alternative.

Alternative B

Under Alternative B, the potential impacts attributable to hazardous material use would be similar to those described for the Proposed Alternative.

⁴ Hazardous waste is defined in 40 CFR 261.

Cumulative Effects

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

Mitigation Requirements

- All construction equipment used in construction of the fish barrier would be periodically inspected for leaks. Any significant leaks would be promptly corrected.
- Secondary containment would be provided for all on-site hazardous materials and hazardous waste storage, including fuels and lubricants used in construction of the fish barrier. In particular, fuel storage (for construction vehicle and equipment) would be a temporary activity occurring only for as long as is needed to support construction activities. 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.

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 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 if Department of Interior agency actions might affect trust assets, the agency address those potential impacts in planning and decision documents and the agency consult with the tribal government whose trust assets are potentially affected.

Trust assets of the Navajo Nation that might be affected by the proposed project include grazing, land, and surface water resources. Reclamation and the Navajo Nation SOD Program coordinated with several Navajo Nation governmental departments, including the Land and Agriculture departments, during the planning phase of the project. The Navajo Nation SOD Program is a branch of the NNDWR.

3.8.2 Environmental Consequences

No Action

Current SOD operating restrictions would remain in effect into the foreseeable future. Permanent dewatering of the reservoir would reduce the amount of water potentially available to irrigators on the adjoining farmland. Existing land use and grazing patterns would persist into the foreseeable future.

Proposed Action

Land: The project area encompasses Captain Tom Dam, the reservoir basin, and surrounding tribally owned land. Ground disturbances resulting from construction and contractor use, including extraction of borrow material, would directly or indirectly affect 55 acres of land adjacent to the existing dam, the To-dil-hil Wash diversion ditch, and within portions of the dewatered reservoir. Following construction, most of this area would constitute the bottom of the reservoir, footprint of the modified dam, and the re-opened To-dil-hil Wash diversion ditch. Access to tribal land within active work areas would be controlled during construction to ensure public safety and welfare.

Construction activities would exercise care to preserve the natural landscape. Except where clearing is required for temporary and permanent work, approved haul roads, 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 BMPs.

Grazing: The footprint of the modified dam would remove approximately 1.8 acres of land that was formerly open to grazing. Loss of this land is minor when compared to the total amount of open range that is available for livestock grazing within the region. Restoration of the reservoir would improve the availability of water resources for livestock watering.

Water: Operation of the new Captain Tom Dam would provide access to a reliable source of irrigation water for Navajo farmers.

Alternative A

Under Alternative A, the effects to trust assets would be similar to those described under the Proposed Action, affecting approximately 59 acres of land.

Alternative B

Under Alternative B, the effects to trust assets would be similar to those described under the Proposed Action, affecting approximately 54 acres of land. At the spillway elevation, impounded waters of the enlarged reservoir would inundate approximately 12 acres of former open range situated between the alignments of the new dam and existing dam,⁵ representing a minor, permanent loss of land that otherwise would be available to grazing. This alternative would increase maximum water storage by 43 percent over the Proposed Action or Alternative B.

Cumulative Effects

The long-term, cumulative effect of the project would be to improve access of Navajo farmers to water resources associated with Captain Tom Wash. Improvement of water supplies for livestock watering would benefit ranchers.

Mitigation Requirements

- Land contours in areas not required for permanent facilities such as the dam and outlet works or subject to permanent inundation would be restored to conform to original conditions.
- Removal of native vegetation would be minimized to the extent practicable.
- Erosion control measures would be installed in work areas where site conditions warrant.
- Vegetation compatible with the existing biotic community and land use would be re-established in work areas following final grading as agreed to by the Navajo Nation.

3.9 Environmental Justice and Socioeconomic Considerations

3.9.1 Affected Environment

Executive Order (EO) 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

⁵ Approximately 8 acres constituting the embankment of the existing dam is fenced to preclude grazing.

origin. The order also requires that “the responsibilities set forth shall apply equally to Native American programs.” There are no residential properties within the project area. Navajo farmers who reside downstream of the project area represent the only EO 12898 population that would be affected by implementation activities.

The Navajo Nation faces serious economic and social challenges. Data obtained from the 2000 Census indicate median household income and average per capita incomes for individuals living in the Newcomb Chapter of the Navajo Nation were substantially below respective levels in San Juan County and the State of New Mexico (Table 5). The unemployment rate in the Newcomb Chapter was almost six times the rate of the general population in San Juan County. Approximately 58 percent of the families in the Chapter live below the Federal poverty levels.

Table 5. Income and poverty statistics.

Attribute	Newcomb Chapter	San Juan County	New Mexico
Population	738	113,801	1,819,046
Median Household Income	\$14,148	\$33,762	\$34,133
Per Capita Income	\$7,194	\$14,282	\$17,261
Unemployment Rate	32.1%	5.5%	4.4%
Persons Below Poverty	57.0%	18.4%	17.7%
Families Below Poverty	57.9%	18.0%	14.5%

Source: U.S. Census Bureau, 2000 Census, <http://factfinder.census.gov/home>. Newcomb Chapter information extracted by LSR Innovations from 2000 census data.

The Navajo Nation has historically lost population to off-reservation communities due to slow rates of economic development and lack of employment opportunities on the reservation. According to the 2000 Census, 298,197 individuals claimed Navajo ethnicity. Approximately 168,000 were Navajo-enrolled members who reside on the Navajo Nation. The remaining Navajo population resides in communities off the reservation.

3.9.2 Environmental Consequences

No Action

Permanent loss of reservoir storage due to SOD operating restrictions would adversely impact the productivity and economic viability of farm land in the long term.

Proposed Action

Potential project effects include soil disturbances, dust emissions, and noise. Project construction 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 as defined in EO 12898.

The project would create long-term socioeconomic benefits by correcting SOD deficiencies and improving conditions for irrigated agriculture and associated farm productivity.

During construction, there would be a minor, short-term economic benefit for local businesses due to construction workers' expenditures on lodging and food. Most of the construction workforce would likely commute from lodging venues in Shiprock and Gallup, New Mexico.

Alternative A

Under Alternative A, the effects to EO 12898 populations and socioeconomic factors would be similar to those described under the Proposed Action.

Alternative B

Under Alternative B, the effects to EO 12898 populations and socioeconomic factors would be similar to those described under the Proposed Action.

Cumulative Effects

The proposed project would have a beneficial, socioeconomic cumulative impact on farmers because of improved reliability of the water supply and corresponding improvements to farm productivity.

Mitigation Requirements

- The project would restore access to reliable supplies of irrigation water and improve the economic viability of farm production. No mitigation is recommended.

CHAPTER 4 - AGENCIES AND PERSONS CONSULTED

List of Preparers

John McGlothlen, Reclamation, NEPA Specialist
Jon Czaplicki, Reclamation, Archaeologist
Henry Messing, Reclamation, Biologist

Other Contributors

Jeff Wormer, Reclamation, Engineer
Chuck Nixon, BIA, Engineer

List of Agencies and Persons Contacted

Hopi Cultural Preservation Office
Hopi Tribal Council
Natural Resources Conservation Service
Navajo Nation Environmental Protection Agency
Navajo Nation Division of Natural Resources
Navajo Nation Fish and Wildlife Department
Navajo Nation Historic Preservation Department
Navajo Nation Land Department
Navajo Nation Mexican Springs Chapter
Navajo Nation Newcomb Chapter
Navajo Nation Toadlena/Two Grey Hills Chapter
Navajo Nation Red Lake Chapter
New Mexico Department of Game and Fish
Pueblo of Zuni
Pueblo of Zuni Cultural Resources Enterprise
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Cooperating Agencies

BIA
Navajo Nation Department of Water Resources

CHAPTER 5 - 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 revised draft EA were made available for public review (see Section 1.5).

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.

Scoping information and the revised draft EA were provided to the FWS and NNFWD for comment on mitigating losses to wildlife resources caused by the project. Comments submitted by FWS on the draft EA are included in Appendix B. This review 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 (see Section 3.4).

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. Land clearing would not occur during the nesting season.

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 (NPDES) 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.

Reclamation would obtain water quality certification under Section 401 and permit coverage under Sections 402 (NPDES) and 404 of the CWA 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 in October 2008. The proposed action would not affect significant 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.

Consultation with the NNHPD regarding effects to an historic Navajo burial site located near the area of potential effect was completed by Reclamation in 2008. The burial site and appropriate buffer as determined by NNHPD would be fenced and avoided during construction.

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 obviate potential flood losses associated with failure of Captain Tom Dam.

Secretarial Order 3175 (Indian Trust Assets) - Indian Trust Assets are legal interests in assets held in trust by the U.S. Government for Indian tribes or individual Indians. Assets are anything owned that has monetary values. They can be real property, physical assets, or intangible property rights. Common examples of trust assets include lands, minerals, water rights, hunting rights, other natural resources, money, or claims.

The project would have the long-term benefit by improving reliability of the water supply for irrigation and livestock watering (see Section 3.8). No adverse impact to Trust Assets has been identified.

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 (see Section 3.9).

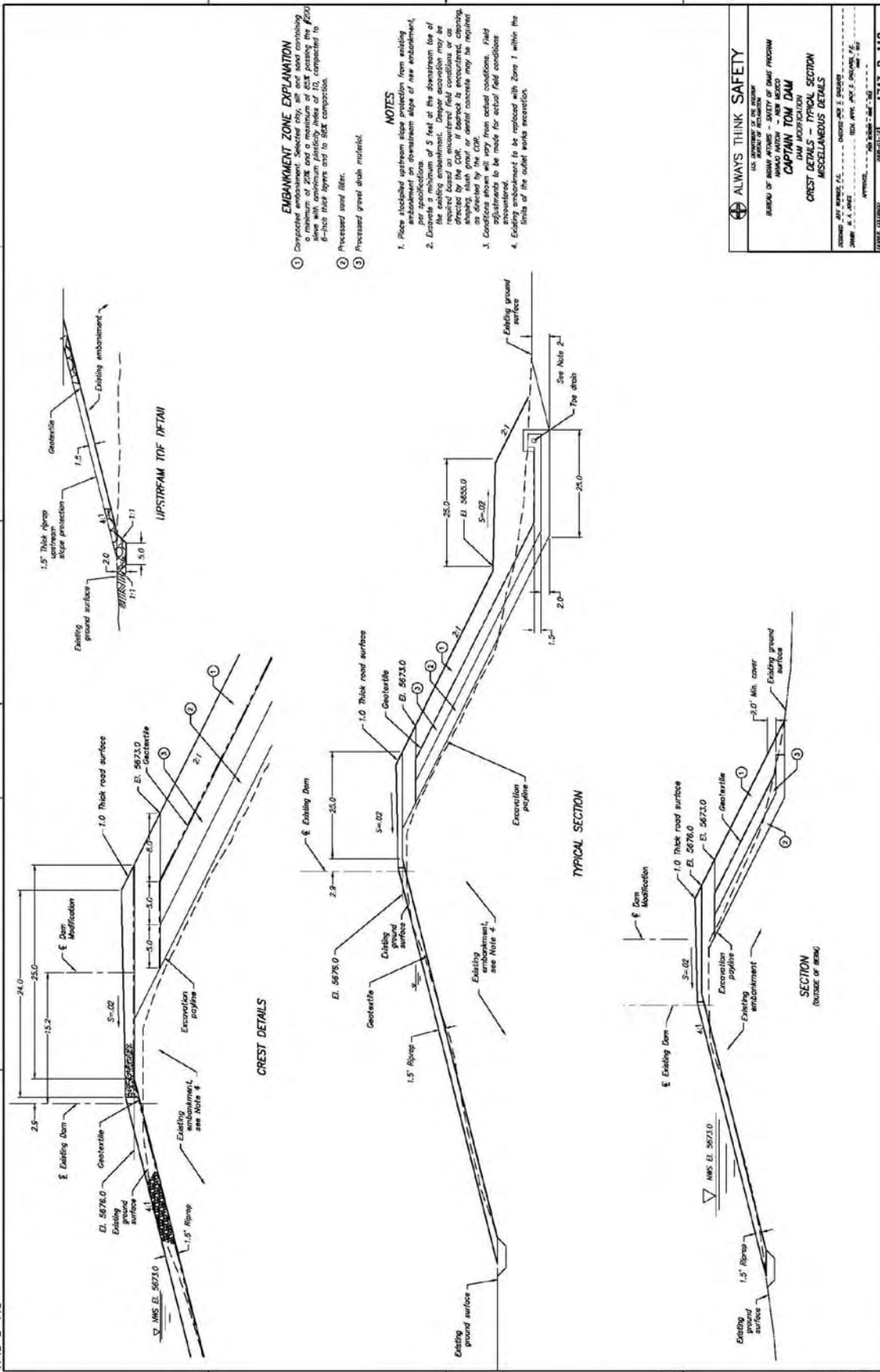
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- Wiens, J.A. and J.T. Rotenberry. 1981. Habitat associations and community structure of birds in shrubsteppe environments. Ecological Monographs 51:21-41.

APPENDIX A

Cross-Sectional View of Modified Captain Tom Dam (Proposed Action)



APPENDIX B

Public Comments

Alternative A Removal and Replacement of the Existing Site – Under Alternative A, the existing dam would be removed and replaced onsite.

Alternative B Construct New Outlet Works and Downstream Stability Berm on Existing Dam – This alternative would include a shear key trench would be excavated along the downstream toe of the existing dam to bedrock. Most of the existing embankment would remain in place. A 20-foot-wide bench would be established at the ground surface between the existing embankment toe and the excavation for construction stability. A substantial earth-fill berm would be constructed over the shear key trench, forming the new downstream embankment of the dam.

Recommendations

Locate new roads to minimize habitat fragmentation and adverse impacts to ecological integrity.

Protect migratory bird resources in accordance with the Migratory Bird Treaty Act.

Conserve all species on the project area listed by the State of New Mexico as threatened or endangered in accordance with state laws and Navajo Nation regulations and guidance.

Continue managing developed and natural water sources for wildlife to support viable wildlife populations and to minimize conflict with mission-related activities.

A program involving production of native seed for rehabilitating roads and other areas with exposed mineral soil should be initiated.

Set topsoil aside and use it as a seed bank spread over areas disturbed during construction.

Construction during the migratory bird breeding season (April 1 – August 31) should be avoided where possible.

Presence/absence migratory bird surveys and nest occupancy should be conducted prior to construction during the breeding season. Surveys would be conducted to ensure that vegetation clearing that occurs before September 1 would not harm nesting migratory birds, and if construction extends into the following breeding season, an additional migratory bird nest survey should be completed.

Mr. John McGlothlen

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Thank you for the opportunity to comment on the DEA for the Captain Tom Dam SOD Project. We appreciate the analyses the Bureau of Reclamation has provided in the past and your current and future efforts to protect fish and wildlife species. In future communication regarding this project, please refer to Consultation #22420-2008-FA-0042. If you have any questions, please contact Santiago Gonzales of my staff at the letterhead address or at (505) 761-4720.

Sincerely,

A handwritten signature in black ink, appearing to read 'Wally Murphy', with a long horizontal flourish extending to the right.

Wally Murphy
Field Supervisor

cc:

Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry
Division, Santa Fe, New Mexico

APPENDIX C

NNHPD Cultural Resources Compliance Form

CULTURAL RESOURCES COMPLIANCE FORM
THE NAVAJO NATION
HISTORIC PRESERVATION DEPARTMENT
 PO BOX 4950
 WINDOW ROCK, ARIZONA 86515

CULTURAL RESOURCES COMPLIANCE FORM	
OCT 31 '08	
DATE	11/3/08
BY	G. G. G. G.
FOR	1500
REVIEW	
CLASSIFICATION	
CONTROL	
PROJECT	

ROUTING: COPIES TO
NM SHPO
XX REAL PROPERTY MGT/330
 BOR

NNHPD NO. HPD-07-1139.1
 OTHER PROJECT NO.

DI-BR-PXAO-ICRS-2008-032

PROJECT TITLE: **Captain Tom Dam: Supplemental Survey 4**

LEAD AGENCY: BIA

SPONSOR: Bruce D. Ellis, Chief, Environmental Resource Management Division, United States Department of Interior, Bureau of Reclamation, Phoenix Area Office, 6150 West Thunderbird Rd., Glendale, Arizona 85306-4001

PROJECT DESCRIPTION: The original plans for the new dam have been dropped. The revised plan calls for the replacement of the outlet works in the existing dam, construction of a support berm along the down stream base of the dam, and the addition of a couple of feet of new material to the top of the dam. An old diversion channel that originally brought water into the reservoir from To-Dil-Hil Wash north of the dam will be cleaned out and reestablished as a supplemental source of water for the dam. Navajo Route 193 that runs northeast of the dam will be realigned to avoid the construction zone. Two supplemental surveys were conducted on approximately 25 acres of land. A small borrow area and contractor use area will be located northeast of the dam. Ground disturbance will be intensive & extensive with the use of heavy equipment.

LAND STATUS: Tribal Trust
 CHAPTER: Two Grey Hills
 LOCATION: Unplatted & Projected T24N, R18W; Newcomb & Tsin-Nas Kid Quadrangles, San Juan County New Mexico NMPM

PROJECT ARCHAEOLOGIST: John S. Czaplicki
 NAVAJO ANTIQUITIES PERMIT NO.: HPD-2008-01 (Blanket Permit)

DATE INSPECTED: 08/28/08
 DATE OF REPORT: 09/02/08
 TOTAL ACREAGE INSPECTED: 25.0 acres

METHOD OF INVESTIGATION: Class III pedestrian inventory with transects spaced 15 m apart.

LIST OF CULTURAL RESOURCES FOUND: None
 LIST OF ELIGIBLE PROPERTIES: None
 LIST OF NON-ELIGIBLE PROPERTIES: None
 LIST OF ARCHAEOLOGICAL RESOURCES: N None

EFFECT/CONDITIONS OF COMPLIANCE: No historic properties affected.

In the event of a discovery ["discovery" means any previously unidentified or incorrectly identified cultural resources including but not limited to archaeological deposits, human remains, or locations reportedly associated with Native American religious/traditional beliefs or practices], all operations in the immediate vicinity of the discovery must cease, and the Navajo Nation Historic Preservation Department must be notified at (928) 871-7148.

FORM PREPARED BY: Tamara Billie
 FINALIZED: September 29, 2008

Notification to

Proceed Recommended: Yes ☒ No ☐
 Conditions: Yes ☐ No ☒

Paul S. Downer 10-2-08
 Paul S. Downer, Navajo Nation
 Historic Preservation Officer Date

Navajo Region Approval:

Yes ☒ No ☐
1/10 10/14/08

John S. Czaplicki 10/21/08
 John S. Czaplicki Regional Director Date