RECLAMATION

Managing Water in the West

Echo Dam, Weber River Project Summit County, Utah, Proposed Safety of Dams Modification, Draft Environmental Assessment PRO-EA-05-003

Weber River Project, Summit County, Utah
Upper Colorado Region
Provo Area Office

U.S. Department of the Interior
Bureau of Reclamation
Provo Area Office
Provo, Utah

June 2009

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

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

Echo Dam, Weber River Project Summit County, Utah, Proposed Safety of Dams Modification, Draft Environmental Assessment PRO-EA-05-003

Weber River Project, Summit County, Utah
Upper Colorado Region
Provo Area Office

Contact Person *W. Russ Findlay*
Provo Area Office
302 East 1860 South
Provo, Utah 84606
801-379-1084

U.S. Department of the Interior
Bureau of Reclamation
Provo Area Office
Provo, Utah

June 2009

Contents

Page

Chapter 1 – Need for Proposed Action and Background 1
1.1 Introduction 1
1.2 Dam Safety Program Overview 1
1.2.1 Safety of Dams NEPA Compliance Requirements 2
1.3 Purpose of and Need for the Proposed Action 2
1.4 Description of Echo Dam and Reservior 2
1.4.1 Echo Dam 3
1.4.2 Echo Reservoir 5
1.4.3 Normal Operations 5
1.5 Geology of Echo Dam 8
1.5.1 Regional Geology 8
1.5.2 Project Area Geology 8
1.6 Permits and Authorizations Required 9
1.7 Scope and Content of this EA 10
Chapter 2 – Proposed Action and No Action Alternatives 11
2.1 Introduction 11
2.2 No Action Alternative 11
2.3 Proposed Action Alternative 11
2.3.1 Dam Foundation Modifications 14
2.3.2 Spillway Modifications 17
2.3.2.1 Structural Alternative 1 – Wall Modification and New Crest Structure 18
2.3.2.2 Structural Alternative 2 – New Crest Structure within Existing Walls 18
2.3.2.3 Structural Alternative 3 – New Crest Structure 19
2.3.2.4 Spillway Foundation Modification 20
Chapter 3 – Affected Environment and Environmental Effects 23
3.1 Introduction 23
3.2 Affected Environment 23
3.2.1 Recreation 23
3.2.2 Water Rights 23
3.2.3 Water Resources 24
3.2.4 Water Quality 24
3.2.5 Public Safety, Access, and Transportation 25
3.2.6 Visual Resources 25
3.2.7 Socioeconomics 26
3.2.8 Cultural Resources 26
3.2.8.1 Cultural History 27
3.2.8.2 Cultural Resources Status 27
3.2.9 Palentological Resources 28
3.2.10 Wetlands and Vegetation 29
3.2.11 Wildlife Resources 30

3.2.12 Threatened, Endangered, and Sensitive Species 32
3.3 Enviornmental Effects of Alternatives 32
3.3.1 Recreation 32
3.3.1.1 No Action Alternative 32
3.3.1.2 Proposed Action Alternative 32
3.3.2 Water Rights 33
3.3.2.1 No Action Alternative 33
3.3.2.2 Proposed Action Alternative 33
3.3.3 Water Resources 33
3.3.3.1 No Action Alternative 33
3.3.3.2 Proposed Action Alternative 34
3.3.4 Water Quality 35
3.3.4.1 No Action Alternative 35
3.3.4.2 Proposed Action Alternative 35
3.3.5 Public Safety, Access, and Transportation 36
3.3.5.1 No Action Alternative 36
3.3.5.2 Proposed Action Alternative 36
3.3.6 Visual Resources 36
3.3.6.1 No Action Alternative 36
3.3.6.2 Proposed Action Alternative 36
3.3.7 Socioeconomics 36
3.3.7.1 No Action Alternative 36
3.3.7.2 Proposed Action Alternative 36
3.3.8 Cultural Resources 37
3.3.8.1 No Action Alternative 37
3.3.8.2 Proposed Action Alternative 37
3.3.9 Paleontological Resources 37
3.3.9.1 No Action Alternative 37
3.3.9.2 Proposed Action Alternative 38
3.3.10 Wetlands and Vegetation 38
3.3.10.1 No Action Alternative 38
3.3.10.2 Proposed Action Alternative 38
3.3.11 Wildlife Resources 38
3.3.11.1 No Action Alternative 38
3.3.11.2 Proposed Action Alternative 39
3.3.12 Threatened, Endangered, and Sensitive Species 39
3.3.12.1 No Action Alternative 39
3.3.12.2 Proposed Action Alternative 39
3.4 Summary of Environmental Effects 41
3.5 Indian Trust Assets 42
3.6 Environmental Justice 42
Chapter 4 – Environmental Commitments 43
Chapter 5 – Consultation and Coordination 47
5.1 Introduction 47
5.2 Public Involvement 47
5.3 Native American Consultation 47

5.4 Paleontology Resources 48
Chapter 6 - Preparers 49
Chapter 7 - References 51

Chapter 1 – Need for Proposed Action and Background

1.1 Introduction

The Bureau of Reclamation (Reclamation) proposes to undertake construction activity at Echo Dam to perform seismic upgrades to the dam and spillway. Echo Dam, part of the Weber River Project, is located about 6 miles north of Coalville, Utah, at the junction of Interstates 80 and 84. The proposed construction activity would require Congressional authorization under the Safety of Dams Act of 1978, Public Law 95-978, as amended. Reclamation has prepared this draft environmental assessment (EA) to comply with procedural requirements of the National Environmental Policy Act of 1969 (NEPA), Public Law 91-90, as amended, and the Council on Environmental Quality and Department of the Interior regulations implementing NEPA. This EA analyzes the potential impacts of the proposed action. As required by the NEPA implementing regulations, if potentially significant impacts to the human environment are identified, an environmental impact statement will be prepared. If no significant impacts are identified, Reclamation will issue a Finding of No Significant Impact (FONSI).

This EA describes the environmental effects of addressing the safety deficiencies of Echo Dam. Under the No Action Alternative, Reclamation would not structurally modify the dam to reduce the risks created by the seismic deficiencies. The existing dam would remain in place and standard operating procedures would continue. This alternative is presented in order to provide a comparison for effects of the proposed action.

Under the Proposed Action Alternative, Reclamation would structurally modify the dam by applying corrective measures to the toe and spillway as well as the upstream berm or crest of the dam. Corrective measures have been developed that would reduce interference with reservoir operations. Under this alternative, construction would require a temporary restriction of the reservoir's maximum surface elevation during two seasons.

1.2 Dam Safety Program Overview

In keeping with the mission to ensure that Reclamation dams do not present unacceptable risk to people, property, and the environment, Reclamation's Dam Safety Program was officially implemented in 1978 with passage of the Reclamation Safety of Dams Act, Public Law 95-578, as amended. This act was amended in 1984 under Public Law 98-404.

Dams must be operated and maintained in a safe manner. Safe operation is ensured through safety inspections, analyses utilizing current technologies and designs, and corrective actions if needed based on current engineering practices.

The Safety of Dams (SOD) Program focuses on evaluating and implementing actions to resolve safety concerns at Reclamation dams. Under this program, Reclamation completes studies and identifies and accomplishes needed corrective action on Reclamation dams. The selected course of action relies on assessments of risks and liabilities with environmental and public involvement input to the decision-making process.

1.2.1 Safety of Dams NEPA Compliance Requirements

As required by Section 5 of the 1978 Reclamation Safety of Dams Act (Public Law 95-978, as amended), this EA must be completed and submitted to the Congress along with a Technical Modification Report and other supporting information, in order to obtain authorization to proceed with the proposed action. The information and analyses in this EA represents the best available information at this stage of the SOD process for Echo Dam. If further analysis is needed after Congressional approval, but prior to or in the early stages of project initiation, the alternative selected for implementation may need to be modified. Project changes not specifically analyzed in this EA will be documented in the administrative record, provided these changes are minor and do not result in greater or different impacts to the environment. Major changes for which additional environmental analysis is appropriate would be analyzed in a supplement to this EA, which would be made available to the public upon request. If a FONSI is issued, rather than a determination that an EIS is necessary, that FONSI would also be modified if warranted by approved project changes, and would be made available to the public upon request.

1.3 Purpose of and Need for the Proposed Action

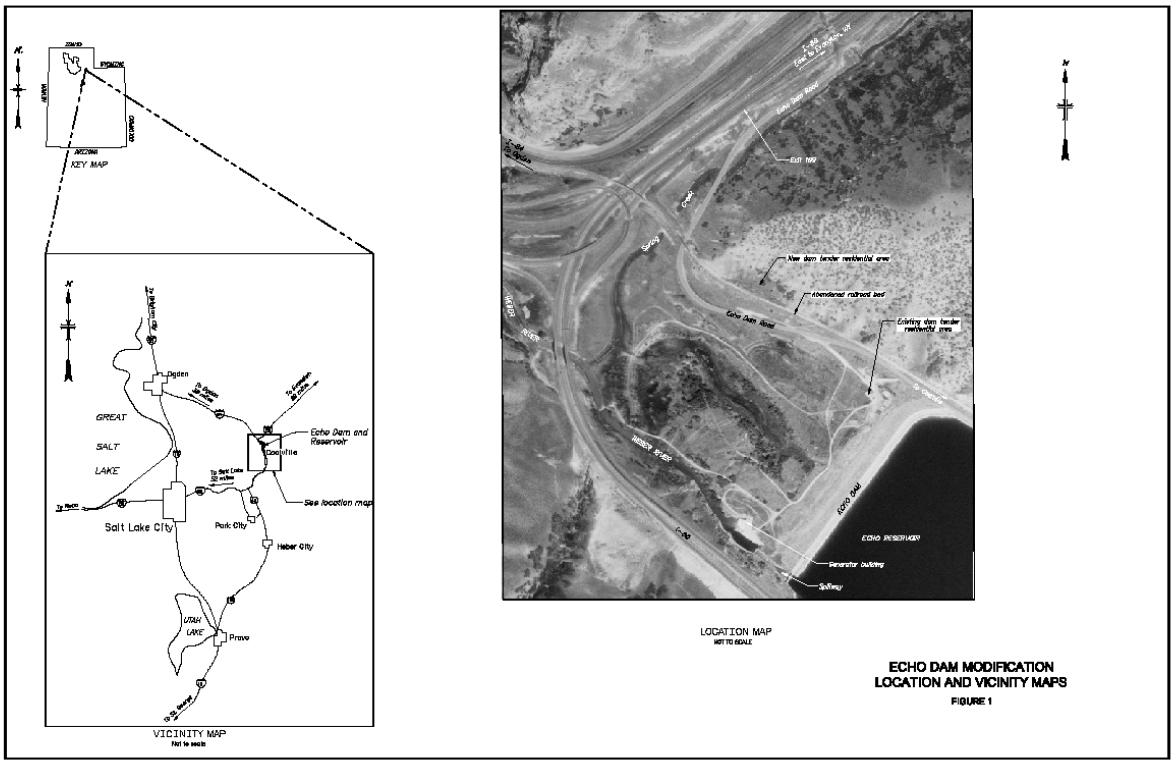
The purpose of the proposed action is to modify Echo Dam to meet current safety standards in order to assure that the dam does not present unacceptable risks to people, property, or the environment. The need for the proposed action is to correct deficiencies which have been identified. Investigations of Echo Dam have confirmed certain safety deficiencies that could contribute to catastrophic failure of the dam. In compliance with Reclamation's SOD program, this EA analyzes recommendations to undertake corrective actions for modifying the dam.

1.4 Description of Echo Dam and Reservoir

The President approved the Weber River Project on January 8, 1927, under the terms of Section 4 of the Act of June 25, 1910, and Subsection B, Section 4, of the Act of December 5, 1924 (43 Stat. 701). Echo Dam and Reservoir are features of the Weber River Project and were completed by Reclamation in 1931

(Figure 1.1). Echo Dam and Reservoir are located in Summit County, Utah, on the Weber River, 6 miles north of Coalville and 28 miles northeast of Salt Lake City. The area is ruggedly picturesque with several Uinta Mountain peaks exceeding 13,000 feet elevation. Echo Dam and Reservoir are operated and maintained by the Weber River Water Users Association (WRWUA) under contract with the Bureau of Reclamation. The reservoir provides water for irrigation for about 109,000 acres of land east of the Great Salt Lake along the heavily populated Wasatch Front and has a total storage capacity of approximately 74,000 acre-feet.

Figure 1.1



1.4.1 Echo Dam

Echo Dam is a zoned, rolled earth-and-rockfill embankment dam with a structural height of 158 feet, a crest width of 25 feet, a crest length of 1,887 feet at elevation 5570 feet above mean sea level, and an estimated embankment volume of 1,540,000 cubic yards. The upstream embankment face has a protective layer of conglomerate fill.

The spillway is located on the left abutment and has a design capacity of 15,000 cubic feet per second (cfs) at full reservoir capacity (water surface elevation 5560 feet). The spillway consists of a concrete-lined inlet channel having a crest elevation of 5543 feet, a gated structure with four 18-feet wide by 17-feet-high

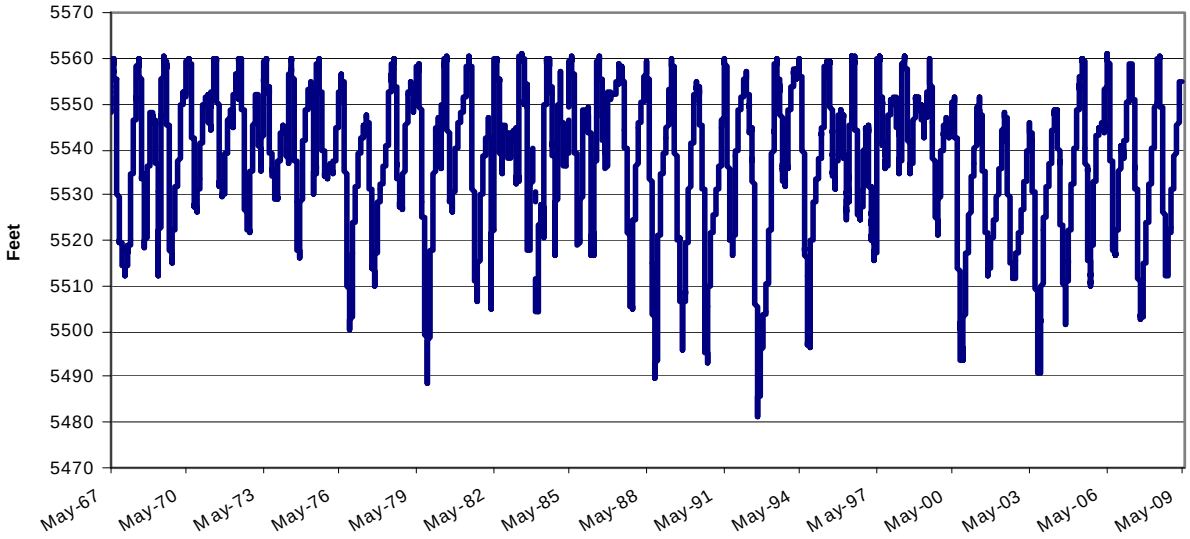
counterbalanced radial gates, a chute, a stilling basin, and an outlet channel terminating in the Weber River.

The outlet works, located in the left abutment, consists of a trash-racked intake structure having an invert elevation of 5450 feet, a 14-foot-diameter horseshoe-shaped tunnel, a gate chamber, two high-pressure gates, each measuring 5 foot wide- by 6-foot-high, and a shaft and shaft house. The outlet works has an 18-foot wide by 12-foot high modified horseshoe-shaped tunnel containing two 6-foot-diameter pressurized steel pipes. The control house includes two 60-inch diameter jet-flow gates for the river outlet works, a stilling basin, and an outlet channel shared with the spillway. The design capacity of the outlet works at the top of joint use, water surface elevation 5560 feet, is 2,100 cfs.

Echo Reservoir water surface generally varies between elevations 5480 and 5560 feet during normal operations, depending on inflows (see Figure 1.2). The maximum reservoir elevation of 5560 feet is typically reached on an annual basis. Safe channel capacity below Echo Dam is rated at 2,000 cfs.

Figure 1.2

ECHO Pool Elevation



Inflow forecasts for Echo Reservoir are made jointly by the National Weather Service and the Natural Resources Conservation Service. Flood control regulations for Echo Reservoir have been developed by Reclamation and approved and issued by the Corps of Engineers as a comprehensive plan for flood control operations of Weber Basin reservoirs.

Previous Reclamation modifications to Echo Dam outlet works include the 1987 replacement of two needle valves with 60-inch jet-flow gate valves. Other

modifications include the 1987 construction of a hydroelectric power plant by Bountiful Light and Power under a Federal Energy Regulatory Commission (FERC) permit. The plant, operated by the City of Bountiful, has three power generators, two producing 1,750 kilowatts (kW) each, and one producing 1,000-kW, for a combined generating capacity of 4.5 megawatts (MW) of power. Water is diverted from the outlet works penstock approximately 40 feet upstream of the high-pressure jet-flow gates. Reclamation has primary jurisdiction over Echo Dam, its appurtenant facilities, and the area immediately adjacent to the dam. Reclamation is responsible for ensuring continued operation of the dam consistent with the purposes of the Weber River Project. Irrigation water is delivered by the WRWUA.

The primary jurisdiction zone encompasses the area around the dam and its adjacent water operations facilities. In order to be able to operate and protect these facilities, Reclamation and the WRWUA control this area by restricting public use. Most of the lands adjacent to Echo Reservoir, except the primary jurisdiction zone immediately surrounding the dam site and the area immediately around the reservoir, are held in private ownership or are owned and managed by other government agencies. Recreational facilities in Echo State Park and those on the reservoir are managed by the Utah Division of Parks and Recreation. Primary activities include boating, water skiing, and fishing, along with picnicking, swimming, and camping.

1.4.2 Echo Reservoir

Echo Reservoir was created by Echo Dam and occupies lands not previously flooded along the Weber River in Weber Canyon. Total capacity of the reservoir at an elevation of 5560 feet is 73,940 acre-feet, with a surface area of 1,455 acres (Table 1.1).

1.4.3 Normal Operations

Echo Dam is the principal feature of the Weber River Project. It is a single-purpose irrigation dam, designed and constructed to provide storage in Echo Reservoir to irrigate lands along the Weber River and lands lying between Ogden, Utah, and the eastern shore of the Great Salt Lake. The reservoir stores approximately 74,000 acre-feet of high flows of the Weber River for release throughout the irrigation season through privately owned distribution systems that divert water from the river to the Association's shareholders. Releases for seasonal irrigation result in very high fluctuations of reservoir water levels. Although not authorized purposes of the project, incidental project benefits include recreation, flood control, and fish and wildlife. Also, hydroelectric power generation is provided by a power plant privately owned by Bountiful Power and Light.

Water sources for Echo Reservoir include flows from the northerly flowing Weber River out of the western Uinta Mountains, Chalk Creek flows from the southwest corner of Wyoming, and Silver Creek flows from Park City, which joins the Weber River in the town of Wanship, Utah.

Echo Dam operation is correlated with the operation of Weber Basin Project dams, including East Canyon, Lost Creek, Pineview, and Wanship (Rockport Reservoir). This correlation accommodates the Army Corp of Engineers' (Corps) Flood Control plan for the Weber River for the *Report on Reservoir Regulation for Flood Control, Weber Basin Reservoirs, Weber River and Tributaries, Utah,* Corps of Engineers, dated July 1971. These regulations provide for combining available storage space in Echo Reservoir with that of Rockport Reservoir, to provide the necessary flood control protection for the Weber River drainage. These regulations provide that when water is stored in the portion of the joint-use pool as required in their flood control plan, releases will be made as rapidly as possible without exceeding non-damaging capacities of 2,000 cfs below Echo Dam. Joint-use capacity is defined as the reservoir capacity assigned to flood control purposes during certain periods of the year and to conservation purposes during other periods of the year.

Table 1.1
Echo Dam and Reservoir
Physical Data

Echo Dam on the Weber River

Type	Zoned earth- and rock-fill
Construction period	November ’27- Dec ‘31
Date of closure (first storage)	1930
Structural height	158 feet
Hydraulic height	113 feet
Top width	25 feet
Crest length	1,887 feet at EL 5570
Total volume	1,540,000 yd^3

Echo Reservoir

Average annual inflow, 1971-2000	267,600 acre-feet
Total capacity to EL 5560 (top of joint use)	73,940 acre-feet
Active capacity, EL 5450-5560	73,940 acre-feet
Dead pool, EL 5450	0
Surface area, EL 5560	1,455 acres
Crest EL	5570 feet

Spillway

Spillway: Located on left abutment. Concrete crest and concrete-lined chute in right abutment, controlled by radial gates. Design capacity: 15,000 ft^3/s at top of joint use. EL top of gates 5560 feet.

Spillway crest: EL5543.

Spillway consists of a concrete-lined inlet channel, a gated structure with four 18-foot-wide by 17-foot-high Counter-balanced radial gates, a chute, a stilling basin, and an outlet channel terminating in the Weber River.

Outlet Works – Located in left abutment

Outlet works capacity: 2100 ft^3/s. The outlet conduit is a concrete-lined horseshoe tunnel to the gatehouse, from which 2 steel pipes pass through a tunnel to the valve house.	Design capacity: Top of joint use EL 5560 is 2100 ft^3/s

Foundation

Echo Dam Hydroelectric Power Plant

Location at Echo Dam – left side of the toe of Echo dam.	Year of initial operation: 1987
Nameplate capacity	
Maximum head	
Power Generators (three):	Two 1750- and one 1000-kilowatt (4.5 megawatts)

Acre-foot = 1 acre-foot covers an area of 1 acre (approximately the size of a football field) to a depth of 1 foot.

1.5 Geology of Echo Dam

1.5.1 Regional Geology

Echo Dam, located on the Weber River, lies between the east-west trending Uinta Mountains to the east and the north-south trending Wasatch Mountains to the west. Bedrock exposed along the Weber River in the vicinity of the dam and reservoir consists of Cretaceous and early Tertiary sedimentary rocks. The beds dip toward the axis of the northeast-trending Parleys Canyon Syncline which is about 1.5 miles downstream of the dam.

The bedrock units in the area of Echo dam consist of the Echo Canyon Conglomerate (Kec), Henefer Formation (Khe), and Frontier Formation. The Frontier Formation is divided into 2 members, the Oyster Ridge Sandstone Member (Kfo), and the Lower member (Kfl).

The Echo Canyon Conglomerate (Kec) is predominantly conglomerate with some discontinuous lenses of sandstone, siltstone, and claystone. The Henefer Formation (Khe) is predominantly composed of interbedded siltstone, sandstone, and conglomerate. The Frontier Formation, Oyster Ridge Sandstone Member (Kfo) is composed of sandstone, siltstone, and silty shale. The Frontier Formation, Lower member (Kfl) is composed of shale, sandstone, conglomeratic sandstone, and silty shale and coal.

1.5.2 Project Area Geology

The floor of the valley is composed of alluvial material deposited by the Weber River or eroded from the valley slopes. These materials were deposited during the Quaternary period and are composed of clay, silt, sand, gravel, cobbles and boulders. For engineering purposes the unconsolidated deposits have been divided into seven geologic units. These include four Quaternary alluvial deposits (Qal1), (Qal2), (Qf1), and (Qf2); a Quaternary colluvial deposit (Qc); and two separate Quaternary landslide deposits (Qols) and (Qls).

Both Quaternary alluvial deposits (Qal1 and Qal2) are found across the full length of the dam foundation. The upper alluvial deposit (Qal1) is finer grained than the Qal2 beneath it and is composed predominately of clay, silt, sand, and gravel. The lower Qal2 deposit, underlying the Qal1 deposit, is composed of coarse sand, gravel, cobbles and boulders. The Quaternary colluvial deposit (Qc) is found as a thin layer of colluvium draped over bedrock and lying under the alluvial fan (Qf1), older landslide (Qols), and Upper Alluvial (Qal1) deposit on the left abutment. The colluvial deposit (Qc) is composed of sand, gravel, cobbles, and boulders.

There are two separate deposits of Quaternary alluvial fan materials. The alluvial fan (Qaf1) deposit is located on the extreme left (west) side of the foundation, and the alluvial fan (Qaf2) deposit is located on the extreme right (east) side of the

foundation. Both Qaf1 and Qaf2 deposits more closely resemble the Qal1 materials, and are composed mainly of silt and sand with some gravel and cobbles.

There are two separate Quaternary landslide deposits (Qols) and (Qls). The older landslide deposit (Qols) is located in the foundation of the dam on the left (west) side of the valley, beneath the spillway, and extending high up on the left abutment. The Qols deposit consists of clay, silt, sand, gravel, cobbles, and boulders. The Qls landslide deposit consists of reactivated portions of the Qols deposit located downstream of the spillway-outlet works channel and southwest of Interstate 80 on the left abutment.

Echo Dam is founded on bedrock composed of the Cretaceous Echo Canyon Conglomerate formation (Kec), mainly composed of shale, claystone, sandstone, siltstone, and some conglomerate.

1.6 Permits and Authorizations Required

Implementation of the proposed action could require a number of authorizations or permits from the Congress as well as state and Federal agencies. These are summarized in Table 1.2

Table 1.2
Permit and Authorizations Required

Agency/Department	Purpose
U.S. Congress	SOD Construction Authorization
Utah Division of Water Quality	Utah Pollution Discharge Elimination System (UPDES) permit required for dewatering.
Utah Division of Water Quality	Storm Water Permit under Section 402 of the Clean Water Act if water is to be discharged as a point source into the Weber River or Echo Reservoir.
State of Utah Department of Natural Resources. Division of Water Rights	Stream Alteration Permit. Required under Section 404 of the Clean Water Act and Utah statutory criteria of stream alteration described in the Utah Code. This permit would be required if any work/access is associated with the Weber River.
U.S. Army Corps of Engineers	Permit under Section 404 of the Clean Water Act for construction activities in waters of the United States, and/or construction activities affecting wetlands.
Utah State Historic Preservation Office	Consultation pursuant to Section 106 of the National Historic Preservation Act, 16 USC 470.
State of Utah. Division of Air Quality.	Air Quality Permit. Required if actual emissions are more than 5 tons per year per air contaminant of any of the following air contaminants: sulfur dioxide (SO^2), carbon monoxide (CO), nitrogen oxides (NOx), particulate matter (PM10), ozone (O3), or volatile organic compounds (VOCs).

1.7 Scope and Content of this EA

The purpose of this EA is to determine whether SOD modifications should be made to Echo Dam, to assure structural integrity and the protection of human life, property, and the environment. The proposed action does not include any changes to operation of Echo Dam or Reservoir outside of standard operating procedures. The elevation of the reservoir's maximum water surface may be restricted during construction. Construction activity would be limited to the immediate vicinity of Echo Dam and borrow areas identified in this EA. If additional gravel is required for the work from other locations, further NEPA compliance would be required.

This EA consists of the following chapters:

1) Need for Proposed Action and Background
2) Proposed Action and No Action Alternatives
3) Affected Environment and Environmental Effects
4) Environmental Commitments
5) Consultation and Coordination
6) Preparers

References

Chapter 2 – Proposed Action and No Action Alternatives

2.1 Introduction

The Bureau of Reclamation considered a range of alternative repair and remediation strategies for Echo Dam that could be implemented to achieve risk reduction for seismic loading. The Proposed Action alternative represents the results of engineering analyses in achieving a technically and economically viable repair to the dam.

2.2 No Action Alternative

The No Action Alternative would allow present conditions and safety deficiencies at Echo Dam to continue. The present deficiencies and risks at Echo Dam would, over time, pose an increasing risk for loss of life or property. This alternative is described in order to provide a basis for characterizing and quantifying the effects of the proposed action.

2.3 Proposed Action Alternative

The Proposed Action Alternative would reduce the seismic risk to Echo Dam by modifying the structure of the dam and spillway. All construction activities would be confined to the dam and spillway and to borrow area(s), with staging areas to be situated immediately adjacent to the dam in the primary jurisdiction zone. The following eight sequential activities are necessary components of the Proposed Action.

1. Dewater Foundation – Dewater the downstream foundation of the dam using a series of wells.

2. Dam Tender Residence Relocation – Demolish existing dam tender residence and outbuildings and construct new facilities outside of the area impacted by proposed modifications to the dam and spillway.

3. Excavate Downstream Keyway - Excavate a portion of the existing downstream embankment and toe drain, and excavate a keyway trench in the downstream foundation of the dam. The anticipated maximum depth of this keyway trench is between 60 and 70 feet.

4. Replace Soil - Replace the liquefiable soil in this keyway trench with engineered fill, including a filtered soil drainage system and a new toe drain.

5. Construct Downstream Berm - Construct an embankment berm over this backfilled keyway trench which extends onto the existing downstream slope of the embankment.

6. Modify Spillway Foundation - Modify the foundation of the upper portion of the spillway by jet grouting.

7. Modify Spillway - Modify the spillway walls and control section (the portion of the spillway used to regulate spillway releases) – approximate dimensions to remain the same as the current structure.

8. Construct Upstream Berm – Construct a rockfill berm against the upstream face of the dam.

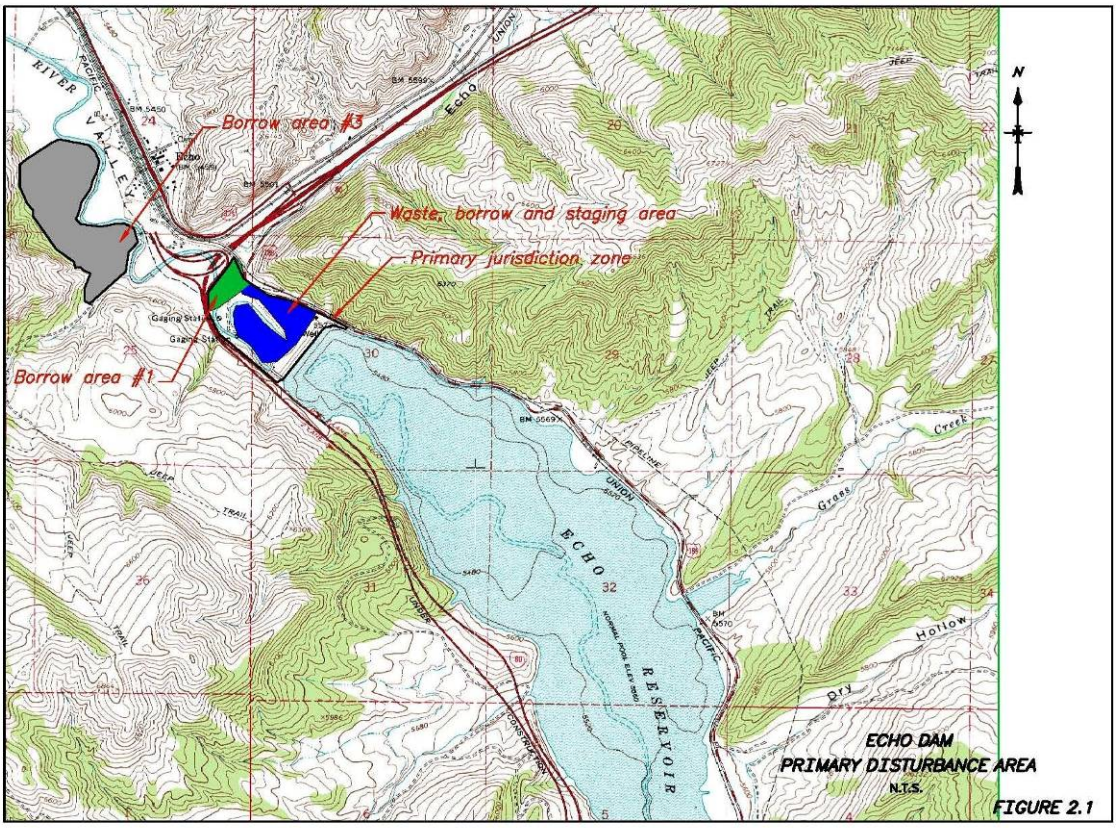
Each of the preceding 8 activities can be categorized into one of two major aspects comprising the Proposed Action Alternative for reducing the seismic risk to Echo Dam. These two aspects are characterized as:

1. Dam Foundation Modifications

2. Spillway Modifications

Descriptions of the methods and options for these activities follow in Sections 2.3.1 and 2.3.2. Both aspects of the work will require the establishment of borrow areas, staging areas, stockpile areas, and temporary construction access roads. With the exception of borrow areas and dam tenders residence locations, which are addressed in section 2.3.1 below, these areas of disturbance will be limited to the primary jurisdiction zone in the immediate vicinity of the dam (see Figure 2.1 below).

Figure 2.1 Echo Dam – Proposed Disturbance Areas



The proposed modifications to the dam and spillway will require two seasonal reservoir water surface elevation restrictions to ensure dam safety during construction activities. The first restriction will be required during excavation of the downstream keyway, to ensure slope stability of the dam during excavation. The reservoir will be required to be drawn down to the approximate elevation of 5500 feet above mean sea level on or about August 15 of the year the keyway work is performed. The reservoir will be permitted to fill above 5500 feet as backfill of the key trench progresses that season. It is anticipated that construction of the downstream berm will occur the following season, with no reservoir restriction required.

The proposed modifications will require a second seasonal reservoir elevation restriction during spillway modification work and construction of the upstream berm, anticipated to occur the third year of the project. This restriction will be implemented to allow for construction of the upstream berm, and to ensure that spillway releases do not occur while the spillway is out of service. The reservoir will be required to be at or below the approximate elevation of 5530 feet on or about June 1 of that year to allow spillway work to begin. The reservoir will be further restricted to the approximate elevation of 5500 feet on or about August 1 to allow for construction of the upstream berm. Once the berm is completed in late summer or early fall, the reservoir will be allowed to fill up to the

approximate elevation of 5530 feet. This restriction will remain in place until spillway modifications are completed, which is anticipated to occur prior to spring runoff the next season.

2.3.1 Dam Foundation Modifications

Field investigations at Echo Dam have indicated that foundation soils underlying the dam are potentially liquefiable and could lose strength during strong ground shaking caused by an earthquake near the site. Analyses have shown that this could lead to slumping of the dam and failure due to overtopping or erosion. The Proposed Action Alternative consists of excavation of the low density foundation soils at the downstream toe of the dam, down to the depth of the underlying foundation bedrock. A dewatering system, consisting of several dewatering wells installed around the perimeter of the shear key excavation area, will be installed to lower the ground water elevation at the toe of the dam allowing for excavation of the shear key in an unsaturated condition. This excavation would be backfilled with the excavated soils and additional engineered fill materials from a local borrow area. The soils placed back into the excavation would be compacted to a very dense state, creating what is called a shear key, and eliminating their potential for liquefaction and strength loss during strong ground shaking.

A downstream berm (a designed mound of soil) would then be constructed over the shear key to provide additional strength to the underlying soils and eliminate potential failure planes that could exit through the existing embankment. This would serve to minimize deformations of the existing crest due to strong ground shaking, and provide filter protection to the existing embankment.

In addition to the excavated shear key and borrow materials, zones of filter and drainage material would be incorporated into the cross-section of the shear key and overlying berm embankment. The filter would be designed to prevent internal erosion and piping of fine-grained soils from within the embankment and the foundation. Piping and internal erosion could occur under static conditions or through cracks formed during strong ground shaking from seismic loading. A zone of drainage material would also be incorporated into the cross-section to provide drainage for seepage through the dam and foundation and to provide a filtered seepage pathway for water that could flow through seismic-induced cracks in the dam.

The existing toe drain system at the downstream toe of the dam would be removed as part of the excavation for the shear key. This toe drain would be replaced with a filtered toe drain which would convey any collected seepage to the downstream toe of the new berm embankment, where it can be visually monitored and measured in observation wells.

An upstream berm would be constructed on the upstream face of the dam to provide strength to prevent deformation of the crest and upstream face of the dam during an earthquake. The upstream berm would be comprised of rockfill

material and would most likely require placement under water. Proposed foundation and berm modifications are shown in Figures 2.2 and 2.3 below.

Figure 2.2 Echo Dam – Proposed Foundation and Berm Modifications

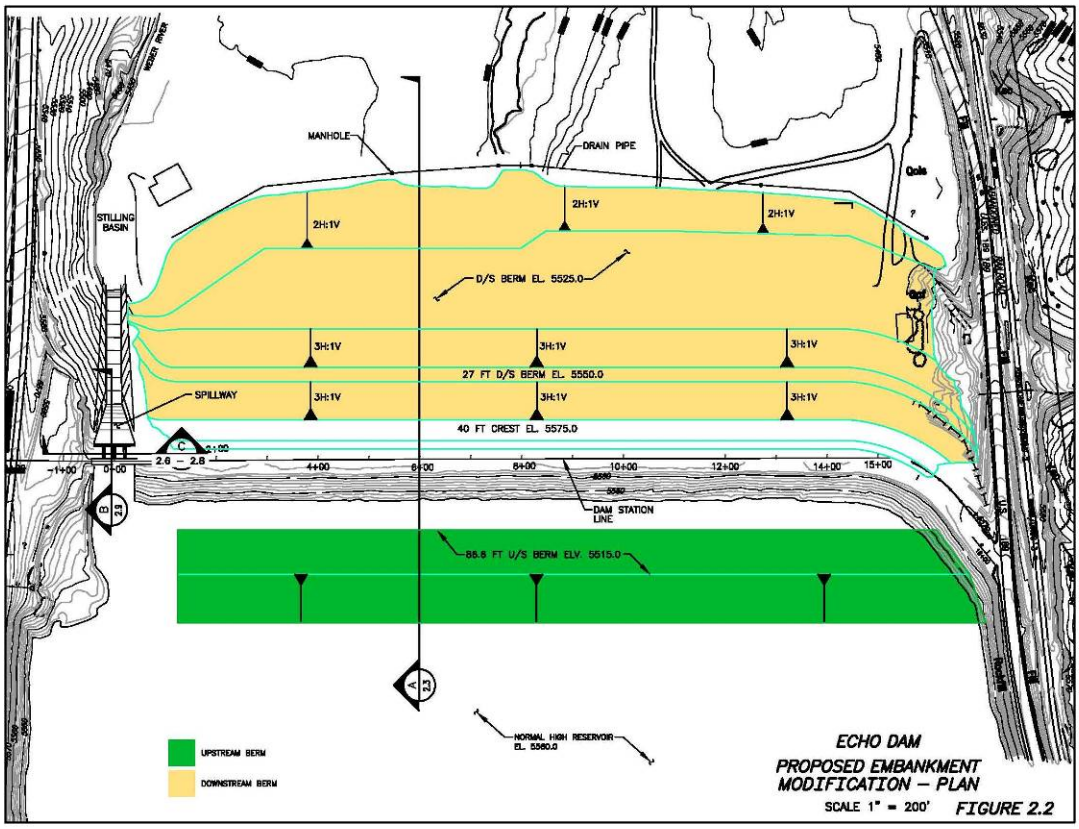
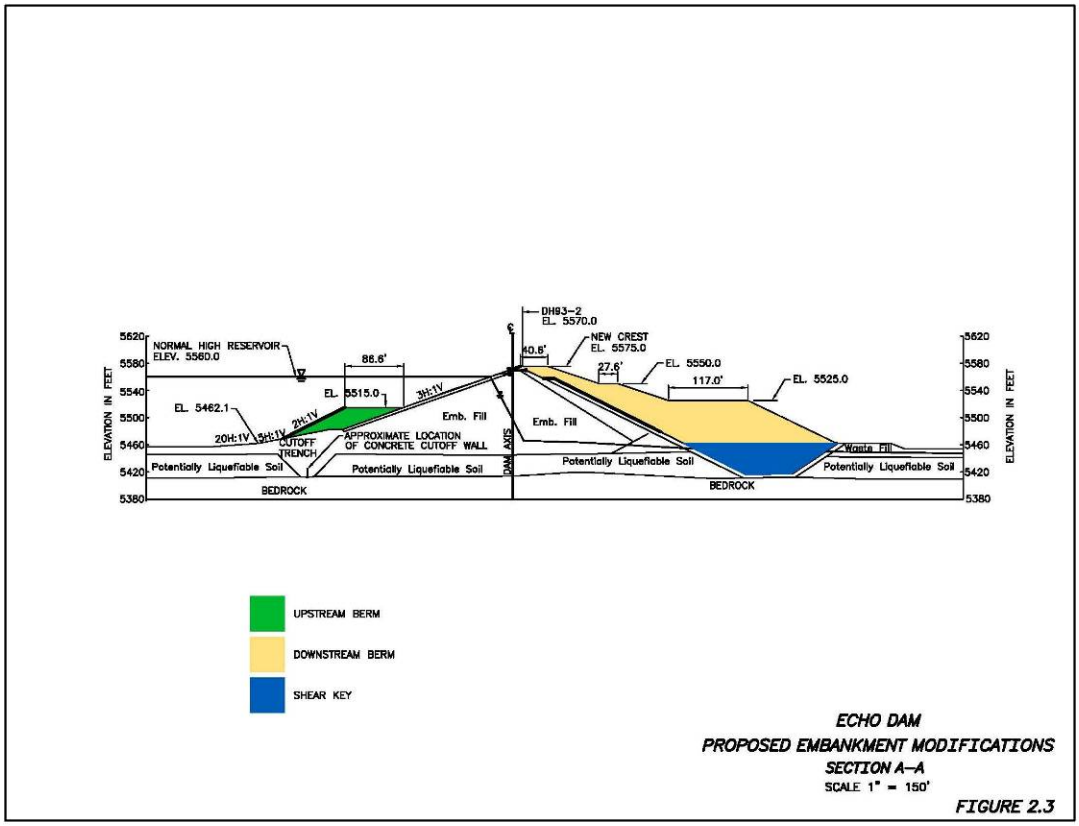
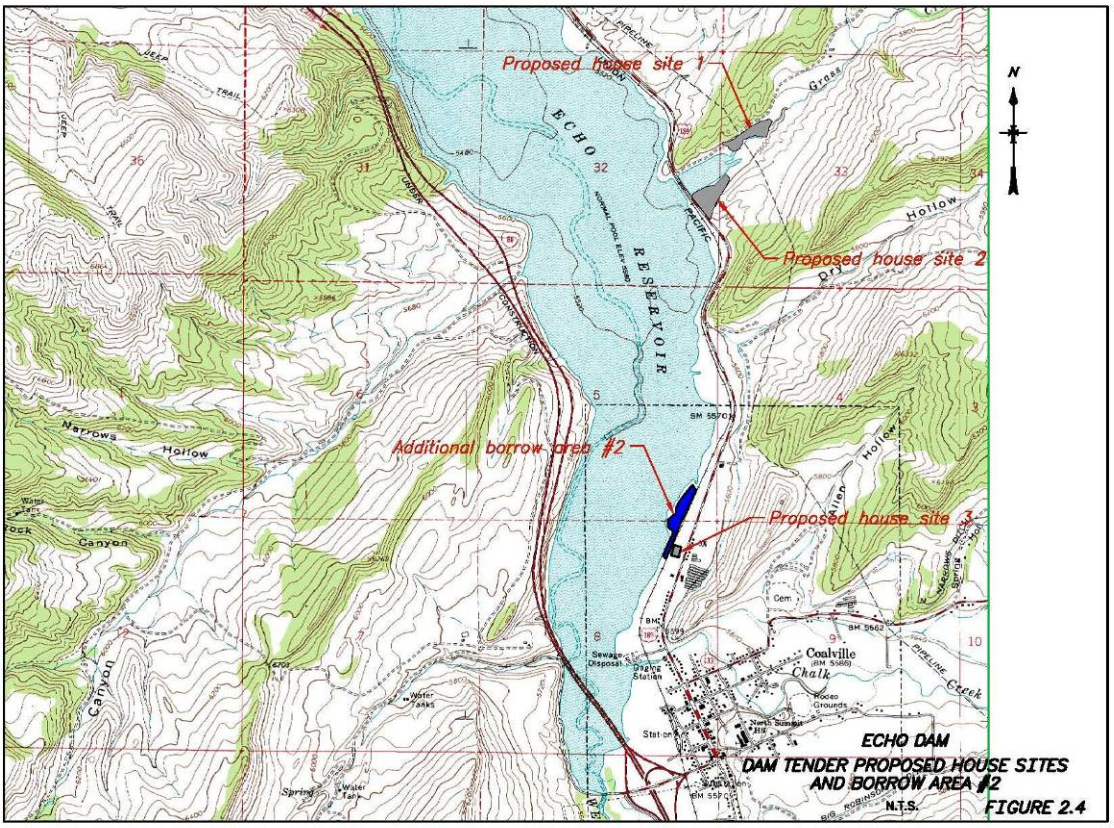


Figure 2.3 Echo Dam – Proposed Foundation and Berm Modifications



Excavation of the shear key and construction of the downstream berm will require removal of an existing residence inhabited by the onsite dam tender, as well as several outbuildings. The existing facilities will be replaced with new facilities outside of the area impacted by the proposed downstream foundation modifications. The new facilities will consist of a single story residence with attached garage and one maintenance outbuilding. The facilities will be located within the existing primary jurisdiction zone at one of three locations on the east side of Echo Reservoir. Potential locations for the new dam tender facilities are shown in Figure 2.4.

Figure 2.4 Proposed Locations for the 'Dam Tender's House'



Earth materials for backfill of the shear key and construction of the upstream and downstream stability berms are anticipated to be obtained primarily from borrow areas in the vicinity of Echo Dam and Reservoir. Potential Borrow Area No. 1 has been identified within the primary jurisdiction zone downstream of Echo Dam (Figure 2.1). Borrow Area No. 2 is also located within the primary jurisdiction zone, along the east shoreline of the reservoir approximately 3.5 miles upstream of the dam (Figure 2.4). An additional source for potential borrow material, Borrow Area No. 3, has been identified on private property approximately 1 mile downstream of the dam, adjacent to the Weber River (Figure 2.1). In addition to the borrow areas identified, sand and gravel materials may be obtained from established commercial pits in the area.

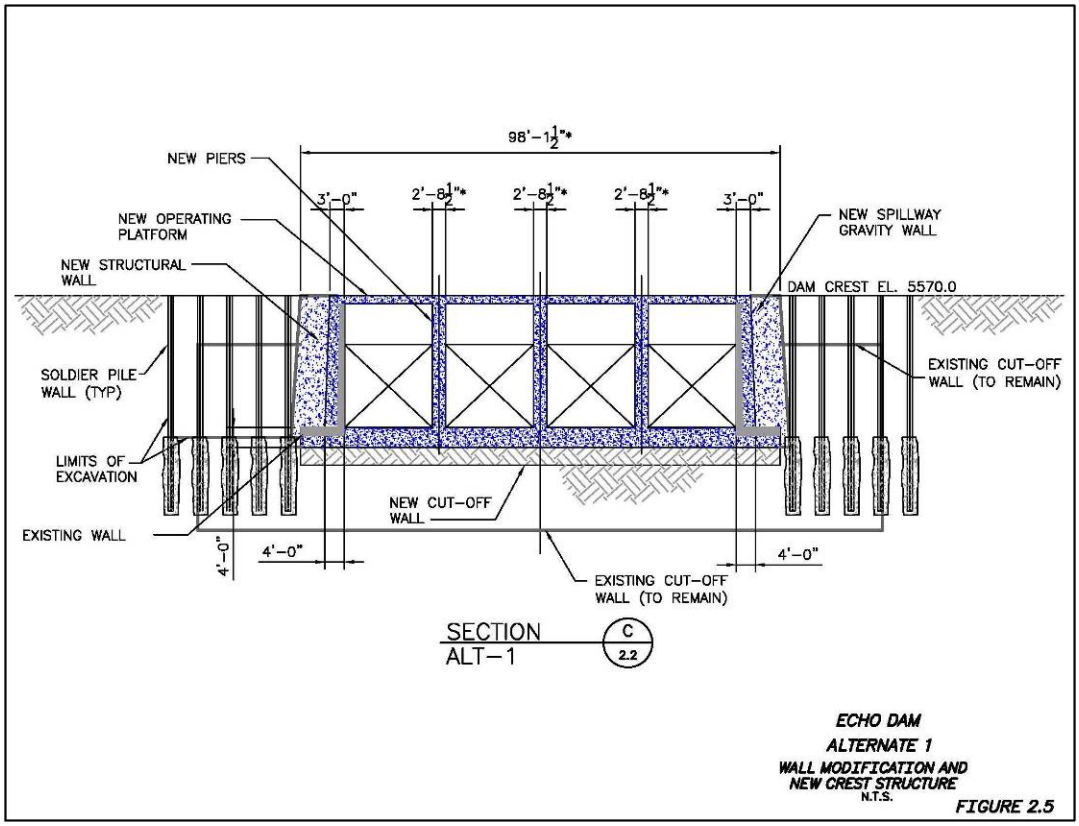
2.3.2 Spillway Modifications

Structural investigations of the Echo Dam Spillway Structure have concluded that the spillway crest structure walls are susceptible to failure (deformation or collapse) due to loading resulting from strong ground shaking caused by an earthquake near the site. Such failure could result in dam failure due to exposure of the embankment fill to erosive spillway flows. Currently three alternatives are being considered for structural modification of the spillway. These alternatives are described below. A preferred alternative will be selected at a later date. Environmental effects are expected to be similar for each of the three alternatives.

2.3.2.1 Structural Alternative 1 – Wall Modification and New Crest Structure

This alternative proposes temporary excavation of material outside of the existing spillway crest structure walls. A temporary soldier pile wall may be installed for excavation support. The existing control structure walls would then be modified to strengthen against failure by constructing new wall panels outside the existing walls, designed to withstand seismic loading. The excavated material would then be replaced with compacted backfill. The existing floor slab, central piers, and support beam between the piers and outside walls of the crest structure would also be removed and replaced with new structural concrete elements meeting current Reclamation design standards. The existing spillway gates would be replaced and new mechanical equipment would be installed. Proposed spillway modifications under Alternative 1 are illustrated in Figure 2.5 below.

Figure 2.5 Proposed Spillway Modifications Under Alternative 1

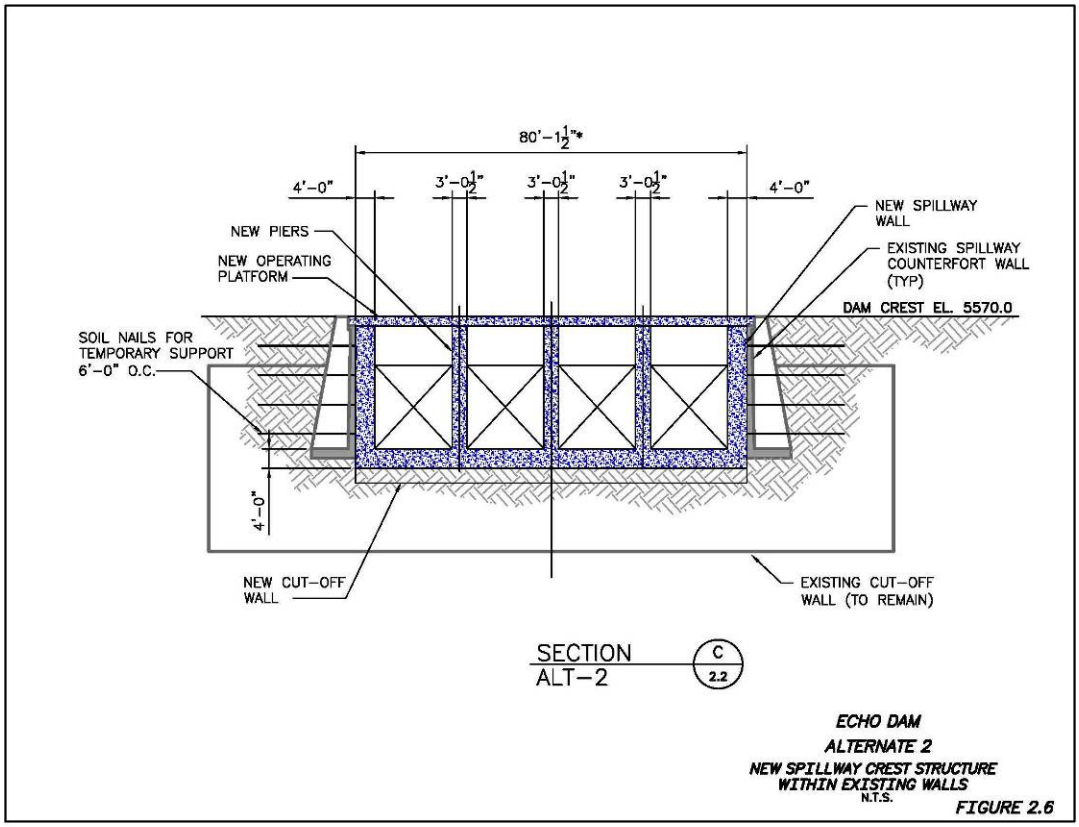


2.3.2.2 Structural Alternative 2 – New Crest Structure within Existing Walls

This alternative involves construction of a new spillway crest structure within the existing crest structure counterfort walls. New sidewalls, designed to withstand potential seismic loading anticipated due to an earthquake in the area of the project site, would be constructed immediately inside of the existing crest structure sidewalls. The existing floor slab, central piers, and support beam would be removed and replaced with new structural concrete elements meeting current Reclamation design standards. The existing spillway gates would be

replaced and new mechanical equipment would be installed. Construction under this alternative would not require excavation outside of the crest structure walls. Proposed spillway modifications under Alternative 2 are illustrated in Figure 2.6 below.

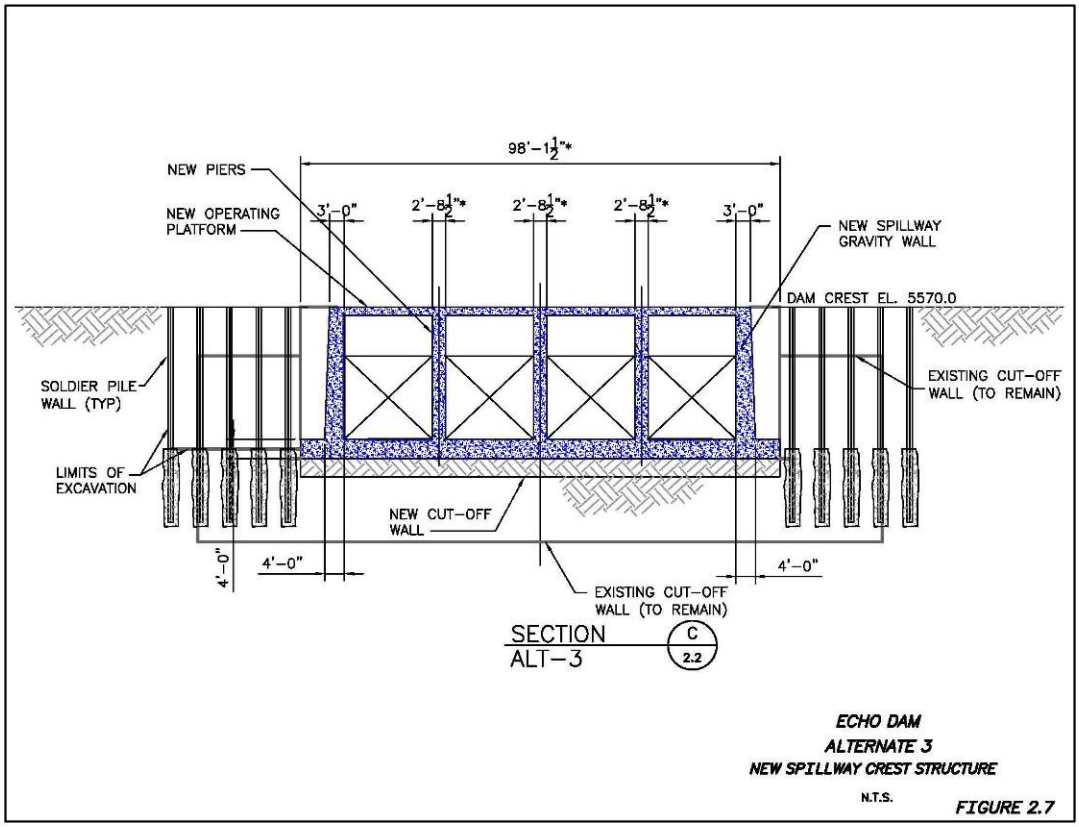
Figure 2.6 Proposed Spillway Modifications Under Alternative 2



2.3.2.3 Structural Alternative 3 – New Crest Structure

Similar to Alternative 1, this alternative would require excavation of material outside of the existing spillway crest structure walls. A temporary soldier pile wall would be installed for excavation support. The existing crests structure walls, floor slab, central piers, and support beam would all be removed and replaced with new structural concrete elements meeting current Reclamation design standards. Excavated material would be replaced with compacted backfill. The existing spillway gates would be replaced and new mechanical equipment would be installed. Proposed spillway modifications under Alternative 3 are illustrated in Figure 2.7 below.

Figure 2.7 Proposed Spillway Modifications Under Alternative 3

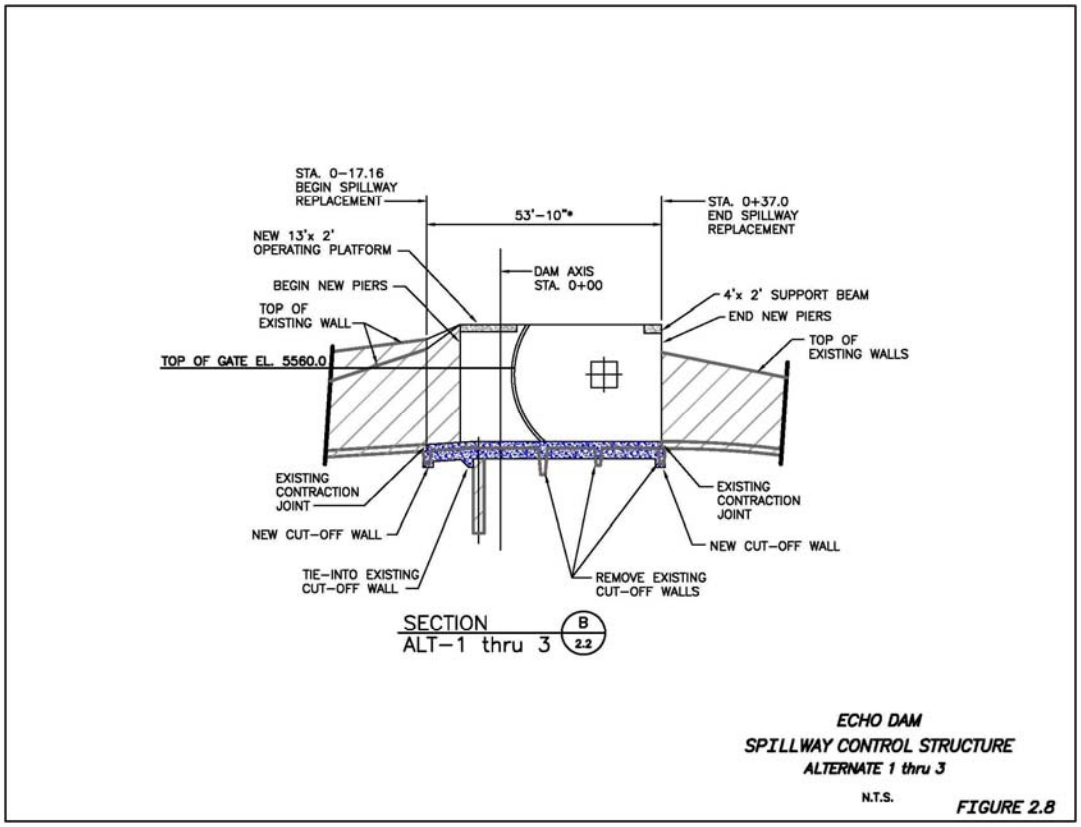


2.3.2.4 Spillway Foundation Modification

In addition to the proposed action to correct structural deficiencies related to the spillway, spillway foundation investigations conducted by Reclamation have concluded that the Echo Dam Spillway crest structure is founded on potentially liquefiable soils that could lose strength during strong ground shaking caused by an earthquake near the site. Analyses have shown that liquefaction of the foundation materials could result in slumping of the spillway foundation and dam failure in the area of the spillway due to overtopping or erosion. Each of the spillway alternatives listed above would include corrective action to improve the spillway foundation. The preferred alternative for spillway foundation modification is jet grouting.

Jet grouting would be performed either through holes cored in the existing concrete floor slab, or after the excavation of the existing slab required for each of the structural alternatives listed above. Jet grouting would create soil-cement columns beneath the spillway to stabilize the existing foundation material. After grouting is completed, the underlying soil beneath the slab would be removed to sufficient depth to allow for installation of new filter and drainage material, along with a new under-drain system. The concrete slab would then be replaced. (See Figure 2.8 below).

Figure 2.8 Proposed Spillway Foundation Modifications



Chapter 3 – Affected Environment and Environmental Effects

3.1 Introduction

This chapter describes the environment affected by the No Action and Proposed Action Alternatives and the predicted impacts of the alternatives. These impacts are discussed under the following randomly ordered resource issues: recreation; water rights; water resources; water quality; public safety, access, and transportation; visual resources; socioeconomics; cultural resources; paleontological resources; wetlands and vegetation; wildlife resources; and threatened, endangered, and sensitive species. The present condition or characteristics of each resource is discussed first, followed by a discussion of the predicted impacts under the No Action and Proposed Action Alternatives. The environmental effects are summarized in Table 3.1 at the end of this chapter.

3.2 Affected Environment

3.2.1 Recreation

Estimated yearly visitation at Echo Reservoir has been around 120,000 to 170,000 persons (Reclamation Use Data Reports). Monthly summer season data generated by Echo Resort suggests July to be the busiest month; followed closely by June, then August.

The four primary reasons guests visit Echo Reservoir are, in order of visitor preference: 1) boating, 2) camping, 3) picnicking, and 4) fishing (Reclamation Use Data Reports). Echo Resort management estimates the length of stay to be one to two days; with user interest 50 percent camping and 50 percent day use. The predominant age group for visitation ranges from 20 to 40 years of age, with visitor origination from the Wasatch Front, namely Salt Lake City, Ogden, and Bountiful.

There are no special recreational uses in the primary jurisdiction zone. In order to be able to operate and protect these facilities, Reclamation and the WRWUA control this area by restricting public uses for security reasons. All public use in the primary jurisdiction zone is prohibited.

3.2.2 Water Rights

Echo Reservoir water storage and use are covered primarily by three water rights. Water Right No. 35-8739(A9568) allows approximately 74,000 acre-feet of water to be stored in Echo Reservoir and to be used for irrigation and stockwatering.

Water Right No. 35-8740(A9580) allows 210.0 cfs of Echo Reservoir releases to be exchanged up to the Weber-Provo Canal for use by the Provo Reservoir Water Users Company and the Extension Irrigation Company. Water Right No. 35-8741(A10745) is held by PacifiCorp and allows releases from Echo Reservoir to be used for power generation. In addition to these three primary rights, various smaller water rights were acquired along with Rights-of-Way for Echo Reservoir.

3.2.3 Water Resources

The Weber River Project provides a supplemental water supply for irrigation of 109,000 acres of highly developed farmlands in Weber and Davis Counties. Echo Reservoir is operated as a seasonal reservoir with no hold over storage. This reservoir stores and delivers 73,960 acre-feet nearly every year to various water users located primarily along the Wasatch Front. The largest subscriber to the Weber River Project is the Davis and Weber Counties Canal Company (D&WCCC) which has roughly 40% of the reservoir capacity or 29,154 acre-feet annually. D&WCCC combines their stored Echo water with 27,554 acre-feet of stored water in East Canyon Reservoir and their direct flow water rights to deliver approximately 70,000 acre-feet of water for irrigation and M&I purposes. Over 21,000 acre-feet of Weber River Project is delivered to the 5 large subscribers including the Hooper Irrigation Company, Wilson Irrigation Company, Plan City, Weber Basin Water Conservancy District, and Warren Irrigation Company along the Northern Wasatch Front. Additionally, 5400 acre-feet of Echo storage is delivered to the Weber Provo canal for use by the Provo Reservoir Water Users Association and the Extension Irrigation Company in Utah County.

The WRWUA is responsible for the repayment of a portion of the construction costs associated with the project. WRWUA administers the delivery of water stored in Echo reservoir to its shareholders, comprised of commercial and residential irrigators. These water deliveries add significant benefits to irrigated lands within the project area.

3.2.4 Water Quality

Echo Reservoir is classified by the State of Utah for the following beneficial uses:

> Class 1C – Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
>
> Class 2A – Protected for primary contact recreation such as swimming.
>
> Class 2B – Protected for secondary contact recreation such as boating, wading, or similar uses.
>
> Class 3A – Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

Class 4 – Protected for agricultural uses including irrigation of crops and stock watering.

The Weber River above and below Echo Reservoir is classified for the following beneficial uses: 1C, 2B, 3A, and 4.

Echo Reservoir is included on Utah's 2008 Integrated Report, Part 3 - 303(d) List of Impaired Waters due to being impaired for the Beneficial Use Class 3A, Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain. Parameters of concern are total phosphorus concentrations, low dissolved oxygen (DO) concentrations, and nuisance algal blooms. The State of Utah is in the process of completing the needed Total Maximum Daily Load (TMDL) analysis for Echo Reservoir, but it has been delayed due to the need to develop more complex load reductions for future conditions that include significant growth in point sources. The preliminary TMDL analysis shows the loading assessment to Echo Reservoir as follows:

- More than 50% of water column <4 mg/l dissolved oxygen in Echo Reservoir above Dam.
- Percent of in-lake total phosphorus concentrations exceeding 0.025 mg/l ranging from 25% - 100%.

The preliminary TMDL analysis shows the water quality targets/endpoints as follows:

- Target Load of 19,800 kg/yr total phosphorus from all tributary sources to Echo Reservoir.
- A shift away from blue-green algal dominance.
- TSI values for Total Phosphorus, Chlorophyll A, and Secchi depth not to exceed 50.

3.2.5 Public Safety, Access, and Transportation

Principal towns near the dam include Echo (approximately 1 mile downstream from the dam), Henefer (approximately 4.6 miles downstream from the dam), and Coalville (approximately 3.75 miles upstream from the dam). Major highways serving the county include Interstate 80, which extends from Salt Lake City, Utah and approaches the dam from the south, intersects with Interstate 84, which extends from Ogden, Utah and approached the dam from the North West, and then proceeds north east into Evanston, Wyoming.

3.2.6 Visual Resources

Echo Dam and Reservoir is situated in the Middle Rocky Mountains, Wasatch Hinterland Section. The landscape is moderately rugged and lower in elevation than either the Wasatch or Uinta Mountains.

3.2.7 Socioeconomics

Echo Dam and Reservoir could affect socioeconomics in four major ways: water use, recreation, hydroelectric power generation, and highway access.

1. The reservoir holds a maximum of 73,900 acre-feet of project water for use by irrigators, municipalities, and other users in Davis, Morgan, Summit, Wasatch, and Weber Counties. At the time of construction, Coalville City, and the town of Echo located south of Echo Reservoir, served the predominantly agricultural economy of the surrounding valley.

2. Echo Reservoir serves as a major source of recreation for residents of Davis, Morgan, Summit, Wasatch, and Weber Counties. Recreation, currently the most prominent economic activity in the valley, is largely centered on the reservoir. Based upon information provided by the Utah Division of Parks and Recreation, the capitalized net present value of recreation associated with Echo Reservoir is calculated at approximately $86.6 million.

3. Hydroelectric power produced at the Echo Powerplant is owned by Bountiful City and marketed by Bountiful City Light and Power. Energy produced at the plant is primarily used by Bountiful City.

4. Access around Echo Reservoir to Coalville City, Utah, and points beyond is provided by Interstate 80 (west side of reservoir), and Echo Dam Road (east side of reservoir).

3.2.8 Cultural Resources

Cultural resources are defined as physical or other expressions of human activity or occupation. Such resources include culturally significant landscapes, prehistoric and historic archaeological sites as well as isolated artifacts or features, traditional cultural properties, Native American and other sacred places, and artifacts and documents of cultural and historic significance.

Section 106 of the National Historic Preservation Act of 1966 (NHPA) stipulates that Reclamation take into account the potential effects of a proposed Federal undertaking on historic properties. Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). This stipulation falls within the broad requirement to preserve important historic, cultural, and natural aspects of our national heritage under NEPA. Further, according to the Reclamation Manual Directives and Standards related to cultural resources management, all Reclamation NEPA actions will be coordinated with the NHPA Section 106 compliance process. Potential effects of the described alternatives on historic properties are the primary focus of this analysis.

3.2.8.1 Cultural History

Water use by pioneers began on the Weber River about 1848, and by 1898 there were over 100 canal companies diverting water from the river and its tributaries. The need for flood control and storage was recognized early, and a number of small reservoirs were constructed by the early canal companies. Reclamation built the 74,000 acre-foot Echo Dam and Reservoir as the principal feature of the Weber River Project from 1927-1931. It later became of part of the Weber Basin Project which was authorized by Congress in 1949. This project conserves and utilizes, for multiple purposes, streamflows in the natural drainage basin of the Weber River, including the basin of the Ogden River, its principal tributary.

In 1986, under the direction of the Bureau of Reclamation, the two needle valves in the outlet works at Echo Dam were replaced with 60 inch jet-flow gate valves. Other modifications to the dam include the construction of a hydroelectric powerplant on the left side of the toe of the dam which was completed in 1987. The powerplant was constructed by Bountiful Power and Light under a Federal Energy Regulatory Commission (FERC) permit.

3.2.8.2 Cultural Resources Status

According to the Section 106 regulations, 36 CFR Part 800 ("Protection of Historic Properties"), of the NHPA, the affected environment for cultural resources is identified as the APE (area of potential effects). The APE is the geographic area or areas within which a Federal undertaking (proposed action) may directly or indirectly cause alterations in the character or use of historic properties. A few recorded historic properties are located near Echo Dam and Reservoir. The APE defined in the action alternatives and analyzed for the proposed action, however, will not impact the previously recorded historic properties. A Class I and Class III cultural resource inventory (Utah State Project No. U-98-BE-0599w) and determination of effect for Echo Dam was completed in 1998 by Reclamation (Coulam 1998). It was determined that Echo Dam was ineligible for the NRHP under Criterion C because it is not particularly representative of a zoned earthfill dam.

A second Class I and Class III cultural resource inventory (Utah State Project No. U-05-BE-0065f) was completed by Reclamation in 2005 for 23.4 acres below Echo Dam, between the base of the dam and Highway 80 on the west and north and State Highway 189 on the east (Blackshear 2005). As a result of the inventory, no historic properties were located within the APE. In compliance with 36 CFR 800.2, consultation with the Utah State Historic Preservation Officer (SHPO) and Indian tribes was completed. SHPO concurred with Reclamation's determination of no historic properties affected for the project.

Design changes following the initial 2005 inventory required that another Class III cultural resource inventory be completed by Reclamation. A total of 7.13 acres, split between three distinct areas, was inventoried and an addendum report was sent to SHPO in 2005. The additional area surveyed included the dam tender's residence, out buildings, and a parcel of land east of State Highway 189

where a proposed new dam tenders residence may be constructed. No historic properties were located during the inventory. Again, consultation was completed, and SHPO concurred with Reclamation's determination of no historic properties affected for the project.

In April 2009, five additional areas were identified as potential project impact areas, four on the eastern side of Echo Reservoir and one located northwest of Echo Dam. The five additional areas, totaling approximately 130.5 acres represents possible locations for a new dam tender's house and borrow areas. Class I and Class III cultural resource inventories were conducted for the additional areas in May 2009. One historic property was located within the inventoried areas. The property, 42SM183, is a segment of the historic Echo and Park City Branch of the Union Pacific Railroad. The site has been determined eligible for the National Register of Historic Places under Criterion A and C, but will be avoided by activities associated with the Echo Dam Safety of Dams Modification Project. A Class III cultural resource inventory report covering the five additional areas was completed in May 2009. Reclamation is recommending a determination of no historic properties affected for the additional inventoried areas and consultation with Indian tribes and SHPO is underway.

3.2.9 Paleontological Resources

A paleontological file search was conducted in 2005 for the project APE by the Utah Geological Survey (UGS). Martha Hayden, Paleontological Assistant with the UGS, was consulted regarding the potential for encountering previously documented and presently unknown paleontological resources in the vicinity of the project APE.

The UGS reply, dated August 12, 2005, on file at Reclamation's Provo Area Office, stated that there are no paleontological localities in the project area. Further, Quaternary alluvial deposits that are exposed in the project APE have a low potential for yielding significant fossil localities. According to the UGS, unless fossils are discovered as a result of construction activities, the project should have no impact on paleontological resources.

A second paleontological file search was conducted in 2009 by the UGS for the five additional project impact areas included in the APE. Martha Hayden, Paleontological Assistant with the UGS, was again consulted.

The UGS reply, dated May 13, 2009, on file at Reclamation's Provo Area Office, stated that there are no paleontological localities in the project area. Further, Quaternary and Recent alluvium deposits exposed in the project APE have a low potential for yielding significant fossil localities. The UGS noted, however, that there may also be exposures of the Cretaceous Henefer Formation that have the potential for yielding significant vertebrate fossil localities. If these units will be disturbed as a result of construction activities, the UGS recommended that the project be evaluated by a permitted paleontologist in order to determine and

mitigate any potential impacts to paleontological resources. According to the UGS, unless fossils are discovered as a result of construction activities, the project should have no impact on paleontological resources.

3.2.10 Wetlands and Vegetation

Riparian Habitat and Wetlands --A large area of riparian habitat, and marsh wetland habitat exists below the dam and along the Weber River. Vegetation around and within the wetland consists mostly of cattail (Typha latifolia) and cottonwood (*Populus Angustifolia*) along with becked sedge (*Carex rostrata*), Sandbar willow (*Salix exigus*), yellow sweet-clover (*Melilotus officinalis*), Canada thistle (*Crisium arvense*), chock cherry (*Prunus virginiana*), elderberry (*Sambucus glauca*), sumack (*Rhus spp*.), astragalus (*Astragalus spp*.), Kentucky bluegrass (*Poa pratensis*), and woolly mullein (*Verbascum thapsus*).

Several cottonwood groves exist in the area below the dam within the primary jurisdiction zone. Sedge (*Carex spp*.) and rush (*Juncus spp*.) communities stabilize the banks of the Weber River. Willows (*Salix spp.*) are dispersed throughout the area as well as alfalfa (*Melilotus officinalis*), Indian ricegrass (*Oryzopsis hymenoides*), crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), curlycup gumweed (*Grindelia squarrosa*), bluebunch wheatgrass (*Agropyron spicatum*), cheatgrass (*Bromus tectorum*), Canada thistle, and blue spruce (*Picea pungens*).

Riprap has been placed along the river corridor for approximately 100 feet downstream from the dam.

Upland Habitat --Both nonnative and native species of vegetation are found within the construction area. Upland habitat consists mainly of big sagebrush (*Artemisia tridentata*) and rabbit brush (*Chrysothamnus* spp.). Other species present include yellow sweet-clover, golden currant (*Ribes aureum*), basin wildrye (*Elymus cinereus*), crested wheatgrass, intermediate wheatgrass, Canada thistle, four wing saltbush (*Atriplex canecens*), curlycup gumweed, juniper (*Juniperus scopulorum*), pepper weed (*Lepidium perfoliatum*), service berry (*Amelanchier alnifolia*), Indian ricegrass, and woolly mullen.

Reservoir Habitat --Wetlands occur around the perimeter of Echo Reservoir. Jurisdictional waters include the area defined by the high waterline of the reservoir and the Weber River feeding the reservoir.

Much of the reservoirs perimeter consists of rock or upland habitats with species as described above. The Weber River delta emptying into Echo Reservoir consist of a large willow dominated habitat. Large groves of cottonwood occur at several locations around the reservoir.

Exposed reservoir bottom consist of muddy and rocky substrates depending on the topography of the exposed shoreline. These areas of exposed reservoir bottom exist during seasonally low reservoir levels. A large expanse of muddy exposed

reservoir bottom occurs where the Weber River deposits fine textured sediment into the reservoir.

3.2.11 Wildlife Resources

Wildlife resources within the general area of the project include fish, big game, smaller mammals, raptors, water birds, and upland game birds, with a variety of other birds, reptiles, and amphibians. These are discussed below.

Fish--Echo reservoir is managed as a put-grow-and-take fishery for rainbow trout (*Oncorhynchus mykiss*). Rainbows are annually stocked in September as adult fish 8 inches long and have good growth rates. Brown trout (*Salmo trutta*) also occur in the reservoir.

Other sport fishes present in the reservoir include smallmouth bass (*Micropterus dolomieui*), yellow perch (*Perca flavescens*), and black crappie (*Pomoxis nigromaculatus*). The smallmouth bass were introduced to provide additional fishing opportunity in the reservoir; however, growth of this species tends to be suboptimal because of the reservoir's cool summer water temperatures. The yellow perch have become a popular ice-fishing catch from December through March.

Nongame fish, including carp (*Cyprinus carpio*), Utah chub (*Gila atraria*), and channel catfish (*Ictalurus punctatus*) reproduce in the reservoir and serve as forage fish for game species. All of these are known to have breeding populations in the reservoir. Other species present in the reservoir include mountain whitefish (*Prosopium williamsoni*), mountain sucker (*Catostomus platyrhynchus*), and Utah sucker (*Catostomus ardens*).

Big Game--The steep foothills surrounding the reservoir are covered mostly with sagebrush, grassland, and oak communities. This area provides big game habitat for both high-value summer use and a critical-value winter use areas for mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus nelsoni*). Large herds of deer and elk are seen wintering in the general area. Moose (*Alces alces*) are occasionally observed along stream drainages near the reservoir. Mountain lion (*Felis concolor*) and black bear (*Ursus americanus*) are rarely seen.

Smaller Mammals--Other mammals common within the area include yellow-bellied marmot *(Marmota plaviventris*), badger (*Tasidea taxus*), least chipmunk (*Eutamias minimus*), golden-mantled ground squirrel (*Spermophilus lateralis*), meadow vole (*Microtus montanus*), northern pocket gopher (*Thomomys talpoides*), deer mouse (*Peromyscus maniculatus*), porcupine *(Erethizon dorsatum*), coyote (*Canis latrans*), and striped skunk (*Mephitis mephitis*). Furbearers such as beaver (*Castor canadensis*), mink (*Mustela vison*), and muskrat (*Ondatra zibethicus*) use the wetland and riparian habitat around the reservoir and embankments of the river. The State of Utah lists sensitive species (species of special concern) with a potential to occur within the area, including

northern flying squirrel (*Glaucomys sabrinus*), and ringtail cat (*Bassariscus astutus*).

Raptors--Birds of prey, or raptors, have been observed within or adjacent to the project area. Cottonwood trees along the river provide nesting habitat for raptors such as the golden eagle (*Aquila chrysaetos*), and red-tailed hawk (*Buteo jamaicensis*) and roosting sites for the great horned owl (*Bubo virginianus*) and bald eagle *(Haliaeetus leucocephalus*). Golden eagles have been observed nesting within one-half mile of the dam. Winter months are the best time to view bald eagles near the reservoir. Other raptors observed in the area are the American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), sharp-shinned hawk (*Accipter striatus*), northern harrier (*Circus cyaneus*), and turkey vulture (*Cathartes aura*).

Water Birds--Numerous water birds occur in the project area such as waterfowl, shore birds, and other wading birds typically associated with wetlands and open water. The reservoir provides high quality habitat for water birds due to the prevalence of emergent wetlands at the mouths of various small drainages around the reservoir. These areas provide important forage and cover sites for waterfowl and wading birds.

Upland Game Birds--Upland game birds known to occur in the area include the ring-necked pheasant *(Phasianus colchicus*), sage grouse (*Centrocerus urophasianus*), mourning dove (*Zenaida macroura*), and chukar (*Alectoris chukar*). Other species that may occur in the area include the ruffed grouse (*Bonasa umbellus*), blue grouse (*Dendrapagus obscurus*), and California quail (*Lophortyx californicus*). The surrounding area may serve as leking habitat (mating area sites) for sage grouse (*Centrocercus urophasianus*) because of the prevalence of sagebrush habitat.

Other Birds--The most common birds at Echo Reservoir are songbirds and similar species associated with terrestrial habitats. These species include sparrows, warblers, thrushes, vireos, swallows, blackbirds, woodpeckers, and hummingbirds. Another group of birds frequently observed at the reservoir comprises the corvids, including jays (*Cyanocitta spp*.), the black-billed magpie (*Pica pica*), and the common raven (*Corvus corax*).

Reptiles and Amphibians--A number of reptiles occur in the general area of the project including the wandering garter snake (*Thamnophis elegans*), Great Basin gopher snake (*Pituophis catenifer*), Great Basin rattlesnake (*Crotalus viridis*), milk snake *(Lampropeltis triangulum*), smooth green snake (*Opheodrys vernalis*), and mountain king snake *(Lampropeltis pyromelana*). The tiger salamander (*Ambystoma tigrinum*), boreal chorus frog (*Pseudacris triseriata*), leopard frog (*Rana pipiens*), and Woodhouse's toad (*Bufo woodhousei*) may also occur in the area.

3.2.12 Threatened, Endangered, and Sensitive Species

Federal agencies are required to ensure that any action federally authorized, funded, or carried out will not adversely affect a federally listed threatened or endangered species.

Below is a list of endangered (E), threatened (T), and candidate (C) species that may occur in the vicinity of the proposed project.

Western Yellow-billed Cuckoo	Coccyzus americanus occidentalis	C
Canada Lynx	Lynx Canadensis	T

There are no known threatened, endangered or candidate wildlife species inhabiting the dam and primary jurisdiction zone where construction would occur.

The Western Yellow-billed Cuckoo is not known to occur within the project area. Canada Lynx have not been reported within the project area or vicinity.

The bald eagle is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. It is a winter resident of the area. This species roosts primarily in forested canyons or tall cottonwoods along streams and reservoirs. There are no known nesting pairs within the project area.

The following is a list of species of special concern, as defined by the State of Utah that may occur within the project area and are managed under Conservation Agreements.

Bonneville Cutthroat Trout	Oncorhynchus clarki utah
Bluehead sucker	*Catostomus discobolus*
Northern goshawk	*Accipiter gentilis*

3.3 Environmental Effects of Alternatives

3.3.1 Recreation

3.3.1.1 No Action Alternative

Without repair, continued future spillway deterioration would be expected until the dam and highway safety, water storage, and resultant recreation uses were threatened. If dam failure resulted recreation would be greatly impacted in direct relation to the water elevation drop and amount of time it remained below the 5500 foot elevation. In the last 30 years it has dropped below 5500 feet eight times; four times lower than 5490 (See Echo Pool Elevation Table.).

3.3.1.2 Proposed Action Alternative

The proposed action involves dropping Echo Reservoir water elevation to 5500 feet for the first of three construction years, and to 5530 feet during the third year.

A full compliment of water for Echo Reservoir is 73,940 acre feet, with an elevation of 5560 feet. In the last 40 years from May 1969 to May 2009, the reservoir has reached the elevation of 5560 feet approximately 32 times. It has been below 5500 feet eight times. The average water elevation has been around 5525 feet to 5530 feet. (See Echo Pool Elevation Table.) At surface elevation 5500 feet, the reservoir contains approximately 16% of capacity. At elevation 5530 feet, the reservoir is at 49% of capacity. All forms of recreation (boating, camping, picnicking, and fishing) would have a temporary, negative influence during the construction period.

3.3.2 Water Rights

3.3.2.1 No Action Alternative

No temporary or permanent changes will be made to the reservoir operations under the No Action Alternative. Therefore, Echo Reservoir water rights will continue to be utilized as they have been historically. There will be no impacts to Echo Reservoir's water rights listed in Section 3.2.2 and there will be no impacts to other water rights in the Weber River systems. There is an increased risk that Echo Reservoir could be sufficiently damaged during an Earthquake that would reduce it storage capacity or make the reservoir inoperable. If the Echo Reservoir water storage becomes restricted for more than 7 years the water rights listed in Section 3.2.2 may become subject forfeited and could be terminated.

3.3.2.2 Proposed Action Alternative

The proposed action does not move the point of diversion or permanently modify the storage capacity of the reservoir. Therefore not change applications would need to be filed on the water rights listed in Section 3.2.2. Additionally, since the duration of the temporary water storage restrictions from the proposed action are significantly less than 7 years, no nonuse applications would be necessary for the reservoir's water rights to protect them from forfeiture.

3.3.3 Water Resources

3.3.3.1 No Action Alternative

The No Action Alternative would have no impact on the water resources including water rights. In the event of dam failure, the No Action Alternative could leave water customers liable for property damages and exposed to the risk of losing all project benefits.

The No Action Alternative could alter Echo Dam operations in the future by not allowing the use of the spillway. This could occur if the spillway is deemed unsafe and which would affect when and how much water is stored in the reservoir. This in turn would affect downstream water users who depend on reservoir water for agricultural and M&I uses. Without a spillway, space would need to be left in the reservoir storage at all times to store the probable maximum flood(PMF). Considering extremely large size of the PMF for Echo Reservoir,

there would be limited space left in the reservoir to store water for irrigation and M&I purposes.

3.3.3.2 Proposed Action Alternative

This Proposed Action Alternative would result in the reservoir water surface being restricted to elevation 5,500 starting August 15th of the first year of construction. At elevation 5500 Echo Reservoir stores 11,830 acre-feet or 16% of its full capacity. This restriction occurs at the end of the irrigation season when the reservoir would normally have a low elevation. The Weber River Project water users will likely use the remaining 11,830 acre-feet to provide water through the end of August and first of September and then end their irrigation early.

During the third year of construction the reservoir water elevation would be restricted again to elevation 5,530 feet or lower starting June 1st and 5,500 feet or lower starting August 1. At water surface elevation of 5,530 feet Echo Reservoir stores 36,100 acre-feet or 49% of its full capacity. It is likely, that Weber River Project water users would receive roughly half their allocated storage water during this year. Fortunately the large subscribers to the Weber River Project listed in Section 3.2.3 also have direct flow water rights that can meet their water needs till the Weber River spring runoff subsides sometime between mid June to mid July. Therefore, depending on the nature of the water year it is possible that even with a half storage allotment these users could continue to irrigate into August. Lastly, D&WCCC has 27,554 acre-feet of storage in East Canyon Reservoir and by coordinating the water deliveries from Echo and East Canyon Reservoirs they can significantly reduce the impacts of these water elevation restrictions on Echo Reservoir. Due to this fact, it is anticipated that East Canyon Reservoir storage water will be more heavily used and the water elevation will be lower during the times that Echo Reservoir water elevations are being restricted.

There are a several smaller Weber River Project water users that rely on water right exchanges with stored water in Echo Reservoir to allow them to divert water from private wells. Approximately 3,800 acre-feet of water has been exchanged to private wells and the water diverted from these wells could be reduced during the repair period. The extent of these reductions would likely be determined by the Weber River Commissioner based on the water available for exchange and how water from the private wells is used. We anticipate that the indoor domestic water uses would be allowed to continue while outdoor irrigation may be temporarily reduced.

In the event of higher than normal winter precipitation, some additional coordination with the WRWUA may be required. However, no significant operational impacts to water resources or deliveries of water would be anticipated from this alternative.

3.3.4 Water Quality

3.3.4.1 No Action Alternative

Since no construction would occur, there would be no temporary construction-related water quality impacts, and no long-term water quality impacts.

3.3.4.2 Proposed Action Alternative

Under the Proposed Action Alternative, best management practices would be employed during construction activities to minimize impacts to water quality in Echo Reservoir and in the Weber River downstream. The following permits could be required to protect water quality, dependent upon the construction methods and handing of potential process or discharge waters from the construction activities:

1. If construction activities include dewatering and discharge to the reservoir or river, a Utah Pollution Discharge Elimination System (UPDES) permit would be required from the Utah Division of Water Quality.

2. A Storm Water Permit under Section 402 of the Clean Water Act may be required from the Utah Division of Water Quality if storm water runoff is to be discharged as a point source into the Weber River or Echo Reservoir.

3. A Stream Alteration Permit from the State of Utah Department of Natural Resources, Division of Water Rights may be required under Section 404 of the Clean Water Act and Utah statutory criteria of stream alteration described in the Utah Code. This permit would be required if any work/access is associated with the Weber River.

4. A permit under Section 404 of the Clean Water Act from the U.S. Army Corps of Engineers may be required for construction activities in waters of the United States, and/or construction activities affecting wetlands, if these activities occur.

The Proposed Action Alternative allows for construction to occur when water levels are usually low in the fall, without requiring additional drawdown to very low levels. Any water quality impacts would be minor and temporary. There would be no long-term or permanent impacts upon water quality.

In the unlikely event that the reservoir were drawn down and operated at levels well below what would be expected to do the work, the hydraulic detention time and flushing rates could be temporarily changed. Operating the reservoir at a very low level could increase the passage of suspended sediment and nutrients downstream. It could also temporarily produce more significant algae blooms, but this would not have a long-term or permanent impact upon water quality in the reservoir or downstream.

3.3.5 Public Safety, Access, and Transportation

3.3.5.1 No Action Alternative

The No Action Alternative would have no effect on access, transportation, or public safety.

3.3.5.2 Proposed Action Alternative

The Proposed Action Alternative would have no effect on access, transportation, or public safety.

3.3.6 Visual Resources

3.3.6.1 No Action Alternative

Without repair, seismic risk issues affecting the safety of the dam and spillway could become a threat to the dam, water storage, and visual resources. The long term result could be the reduction of water storage, short duration outflows and consequent impairment of the visual resource around the reservoir, displaying barren, nonvegetated reservoir bottom slopes.

3.3.6.2 Proposed Action Alternative

Some short term results of the Proposed Action Alternative on the spillway and below the dam are expected as seen from I-80. The visual resources of the reservoir at drawdown during the construction period would certainly be noticeable but not out of character considering the historical variations noted previously.

3.3.7 Socioeconomics

Analyses for the socioeconomics reflect the federal fiscal year discount rate of 4.875 percent for 2009 and a project life of 50 years, in converting annual monetary values to capitalized net present values. The Proposed Action alternative would result in no benefit/cost for recreation, irrigation, or commercial interests.

3.3.7.1 No Action Alternative

Under the No Action Alternative, there would be no impacts to socioeconomics. In the event of dam failure, approximately $4 billion in property and project benefits could remain exposed to increasing risk over time.

3.3.7.2 Proposed Action Alternative

The Proposed Action Alternative would result in restoration of the full capacity of the dam, so there would be no measurable long-term effects to socioeconomics. Under this alternative, effects to socioeconomics such as recreation, reservoir yield, traffic, commerce, and construction are discussed below.

Recreation—Under the Proposed Action Alternative, no significant impacts on recreation would be anticipated. Construction would be scheduled to minimize restriction in reservoir operations.

Reservoir Yield—Under the Proposed Action Alternative, no effect on the irrigation water supply would be expected, since no permanent restriction of the reservoir level would be anticipated.

Traffic—In situ methods would be accomplished with little or no impact to public safety and transportation.

Commerce—No measurable effect to the commercial sector would be expected from implementation of the Proposed Action Alternative. The minimal traffic impacts would not be expected to have any additional effects beyond those quantified in Public Safety, Access, and Transportation.
Construction—The cost of construction would represent an infusion of additional capital into the area economy, and would therefore be classified as a short-term benefit .

3.3.8 Cultural Resources

3.3.8.1 No Action Alternative

Under the No Action Alternative, there would be no effect to historic properties. Reclamation would not structurally or visually modify the dam to reduce the risks created by the geological instability of the soils beneath. The complex of houses used by the dam tender would not be removed, and any potential borrow or staging areas would not be needed. The existing conditions and structures would remain intact and would not be affected.

3.3.8.2 Proposed Action Alternative

Under the Proposed Action Alternative, the work on the dam and spillway, including the destruction and removal of the dam tender's residence and out buildings would not have an effect on historic properties because they have all been determined ineligible for the NRHP. Additional areas around Echo Dam and Reservoir associated with potential borrow areas and possible locations for a new dam tender's house have also been inventoried at a Class III level. One historic property was identified during these various inventories, but will be avoided by activities associated with the proposed Echo Dam Safety of Dams Modification Project. Therefore, there are no anticipated effects to historic properties as a result of the Proposed Action Alternative.

3.3.9 Paleontological Resources

3.3.9.1 No Action Alternative

Under the No Action Alternative, there would be no effect to paleontological resources. Reclamation would not create any new ground disturbance, as no structural or visual modifications would be made to the dam. Further, the complex of houses used by the dam tender would not be removed, and any potential borrow or staging areas would not be needed. The existing conditions would remain intact and would not be affected.

3.3.9.2 Proposed Action Alternative

Under the Proposed Action Alternative, there would be no anticipated effect to paleontological resources. File searches of the project APE, as presently designed, were completed by the UGS on August 12, 2005 and May 13, 2009. The geologic deposits that are exposed in the APE have a low potential for yielding significant fossil localities. Therefore, unless fossils are discovered as a result of construction activities, the Proposed Action Alternatives should have no effect on paleontological resources.

3.3.10 Wetlands and Vegetation

3.3.10.1 No Action Alternative

Under the No Action Alternative, no immediate impacts to wetland vegetation would occur. However, if the dam were to fail, all downstream wetlands would be washed out immediately. Wetlands around the reservoir's perimeter would persist until the lowered water table no longer supported the hydrophytes (vegetation growing only in water or very wet soil), after which plant life would be replaced naturally by upland plant species.

3.3.10.2 Proposed Action Alternative

Under the proposed action alternative, work would occur outside the marsh type wetland areas and no permanent impacts are expected. After work is completed seepage from the dam is expected to continue which in turn would support the hydrophytic vegetation below the dam.

Upland vegetation would be disturbed in construction, borrow, and staging areas. Most of these areas within the construction zone have been disturbed previously and have a strong component of nonnative species and weeds. All disturbed areas would be re-contoured and re-vegetated with appropriate native species. No long term negative effects would occur from the proposed project.

Restricted reservoir levels would take place for two seasons. There would be no long-term lowering of the reservoir, thus no wetlands along the shore of the reservoir would be permanently affected.

3.3.11 Wildlife Resources

3.3.11.1 No Action Alternative

Under the No Action Alternative, there would be no significant effect on wildlife species such as upland game and big game and no effect on their habitat. The reservoir water would continue to stratify, affecting fish in the reservoir and at times those in the Weber River immediately downstream from the dam when the reservoir level is low.

If the dam were to fail, negative effects would occur to shoreline vegetation, open water, and wildlife species closely associated with the riparian and reservoir habitat. As these areas dry up over time, wildlife habitat would be lost, resulting

in a significant loss of fish, water birds, and other species dependent upon the reservoir.

3.3.11.2 Proposed Action Alternative

Under the Proposed Action Alternative, there would be no long term detrimental effects to wildlife dependent upon the reservoir. Adding stability to the dam would ensure shoreline, riparian, and open water habitat for fish and wildlife species.

During construction, temporary negative impacts would occur. Initial construction activity would cause stress to some wildlife species from noise, dust, displacement, and temporary loss of habitat, until construction was completed. Reservoir water would be drawn down to an elevation of approximately 5500 feet for the first and third year of construction, leaving 53 feet of water in the reservoir. Echo Reservoir is regularly drawn down below elevation 5500 feet; however, this level in not usually reached until October. The proposed reservoir restriction must be met during August. This restriction may cause stress to the reservoir fishery. In the unlikely event that the reservoir's fishery is lost, restocking of the fishery would be required after SOD construction is completed. Re-stocking efforts would reestablish the reservoirs fishery; thus, no long term negative effects would occur.

3.3.12 Threatened, Endangered, and Sensitive Species

3.3.12.1 No Action Alternative

The No Action Alternative would result in no effects to threatened, endangered, or special status species. However, if the dam were to fail in the future, negative impacts due to loss of habitat from excessive erosion and sedimentation of the river drainage below the dam would occur.

3.3.12.2 Proposed Action Alternative

Bald eagles are winter residents of this area and may be displaced by construction activities (noise and habitat disturbance). Cottonwood trees and dead snags should be avoided during construction. However, loss of several trees may occur. This could displace eagles. These effects would be short term or very limited in extent and would have no significant negative effects, since these birds would be able to use abundant similar roost sites or other habitat elements in the immediate vicinity of the project. All winter construction activities occurring within ½ mile of any bald eagle roost site would be restricted to hours between 9:00 a.m. and 4:00 p.m., from November 1st to March 31st and into April, if necessary, until all bald eagles have left the area.

Canada lynx have not been seen in the area for many years. Therefore, no effects would occur to them.

Western yellow-billed cuckoo have not been observed within the area affected by this alternative. However, a few individuals may migrate through the area. The

extent of disturbance associated by this project would leave a large area of suitable habitat unaffected, allowing any possible use by these birds to occur in these adjacent areas.

Fish species managed under conservation agreements (i.e. bluehead sucker, Bonneville cutthroat trout) may temporarily be disturbed within areas where construction activities affect riparian or riverine habitats. These species would likely move to areas unaffected by the proposed project, either upstream or downstream. Sedimentation of the river below constriction areas would disturb spawning and feeding beds temporarily until flushing flows restore these habitats.

Spotted frogs have not been found in the area. Any other frogs that are present would be displaced by construction activities in riparian and wetland habitats until these areas recover.

Northern goshawk may use habitats within the area of disturbance. The extent of disturbance associated by this project would leave large areas of suitable habitat unaffected, allowing any possible use by these birds to occur in these adjacent areas. Therefore, affects to them would be negligible.

The Proposed Action Alternative would result in no significant effects to threatened, endangered, or special status species.

3.4 Summary of Environmental Effects

Table 3.1 describes environmental effects under the No Action Alternative and the Proposed Action Alternative.

Table 3.1
Summary of Environmental Effects

	Alternatives	
Resource Issue	**No Action Alternative**	**Proposed Action Alternative**
Recreation	No effect until dam failure causes water elevation to drop.	Negative temporary effect for two-year construction period.
Water Resources	No effect	No significant permanent operational effects. There will be significant reduction in water storage for one to two years during construction when Echo Reservoir elevation is restricted. During this time period water users will receive significantly less stored water. WRWUA would be required to repay 15 percent of the cost incurred by Reclamation in making the structural modifications to the dam. (In the event of dam failure caused by an earthquake, water resources would be exposed to losing all project purposes as well as liability for property damages.)
Water Quality	No effect	Minimal/temporary effects during construction. No Long-term effects.
Public Safety, Access, and Transportation	No effect	Minor traffic delays would occur which would create an inconvenience and could constitute a safety concern.
Visual Resources	No effect	Effects from modifying the face of the dam are acceptable.
Socioeconomics	No effect	Capital cost of proposed action: $22 million. (In the event of dam failure caused by an earthquake, approximately $5.5 billion in property and project benefits would remain at risk.)
Cultural Resources	No effect	Since Echo Dam and the associated dam tender's buildings are not eligible for the NRHP, no effect to cultural resources is expected.
Paleontological Resources	No Effect	No effect to paleontological resources is expected
Wetlands and Vegetation	No effect	No effect
Wildlife Resources	No effect	Temporary negative effects to wildlife near the dam could occur during construction activities. The game fishery could be negatively affected and may need to be replaced after Construction activities. These effects would be temporary.
Threatened and Endangered Species	No effect	No effect

3.5 Indian Trust Assets

Indian trust assets are legal interests in property held in trust by the United States for federally recognized Indian tribes or Indian individuals. Assets can be real property, physical assets, or intangible property rights, such as lands, minerals, hunting and fishing rights, and water rights. The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to such tribes or individuals by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that all federal agencies take all actions reasonably necessary to protect trust assets. Reclamation would carry out its activities in a manner which protects these assets and avoids adverse impacts when possible. When impacts cannot be avoided, Reclamation would provide appropriate mitigation or compensation. Implementation of the Proposed Action Alternative would have no foreseeable negative impacts on Indian Trust Assets.

3.6 Environmental Justice

Executive Order 12898 established environmental justice as a federal agency priority to ensure that minority and low-income groups are not disproportionately affected by federal actions. Echo Dam is located in Summit County. As of 2000, the population of Summit County was 29,736 consisting of 1,609 individuals living below poverty level and 3,128 individuals belonging to various minority groups. Statistics for the year 2000 are the most recent available (Utah Governor's Office of Planning and Budget).

Implementation of the Proposed Action Alternative would not disproportionately (unequally) affect any low-income or minority communities within the project area. The reason for this is that the proposed project would not involve major facility construction, population relocation, health hazards, hazardous waste, property takings, or substantial economic impacts. This alternative would therefore have no adverse human health or environmental effects on minority and low-income populations as defined by environmental justice policies and directives.

Chapter 4 – Environmental Commitments

The following environmental commitments would be implemented as an integral part of the Proposed Action Alternative.

1. Standard Reclamation Management Practices--Standard Reclamation management practices would be applied during construction activities to minimize environmental effects and would be implemented by Reclamation construction forces or included in construction specifications. Such practices or specifications include sections in the present report on public safety, dust abatement, air pollution, noise abatement, water pollution abatement, waste material disposal, erosion control, archaeological and historical resources, vegetation, and wildlife.

2. Additional Analyses--If the proposed action were to change significantly from that described in the EA because of additional or new information, such as drawing down the reservoir to low levels (beyond normal operations), or if other spoil, gravel pit, or work areas beyond those outlined in this analysis are required outside the primary jurisdiction zone, additional environmental analyses may be necessary.

3. 404 Permit or State Stream Alteration Permit (or Both) Required--Before beginning construction activities, Reclamation would obtain from the U.S. Army Corps of Engineers a 404 Permit, Clean Water Act of 1977 (P.L. 217), or from the Department of Natural Resources a State Stream Alteration Permit. These permits would include discharges of dredged or fill material into the waters of the United States. Such activities associated with this project could include cofferdams, disposal sites for excavated material or construction material sources, and rebuilding dam embankments. The conditions and requirements of the 404 Permit would be strictly adhered to by Reclamation. Reclamation would fully mitigate any loss of jurisdictional wetland with appropriate in-basin, in-kind mitigation as determined in consultation with the U.S. Army Corps of Engineers and the State of Utah, and as required for obtaining a Corps 404 Permit or a State Stream Alteration Permit.

4. A Utah Pollutant Discharge Elimination System Permit--A Utah Pollutant Discharge Elimination System Permit would be required from the State of Utah before any discharges of water, if such water is to be discharged as a point source into the Weber River. Appropriate measures would be taken to ensure that construction related sediments would not

enter the stream either during or after construction. Settlement ponds and intercepting ditches for capturing sediments would be constructed and the sediment and other contents collected would be hauled off the site for appropriate disposal upon completion of the project.

5. A Water Quality Certification and a Storm Water Discharge Permit--Under authority of the Clean Water Act, construction would require from the Utah Division of Water Quality a Section 401 Water Quality Certification and a Section 402 Storm Water Discharge Permit.

6. Cultural Resources—Site 42SM183 will be avoided by all construction activities associated with the project. A ten foot buffer on either side of the historic railroad grade will be used to avoid disturbance to the site. Any person who knows or has reason to know that he/she has inadvertently discovered possible human remains on Federal or tribal lands, must provide immediate telephone notification of the discovery to Reclamation's Provo Area Office archaeologist. Work would stop until the proper authorities were able to assess the situation on-site. This action would promptly be followed by written confirmation to the responsible Federal agency official with respect to Federal lands. On tribal lands the discovery would be reported to the responsible Indian tribal official. Consultation would begin immediately. This requirement is prescribed under the Native American Graves Protection and Repatriation Act regulations (43 CFR Part 10). The foregoing clause and instructions for proper procedures in case of such a discovery would be placed in all construction vehicles.

7. Construction Activities Confined to Previously Disturbed Areas--All construction activities would be confined to previously disturbed areas, to the extent practicable, for such activities as work, staging, and storage; gravel pit; waste areas; and vehicle and equipment parking areas.

8. Public Access--Construction sites would be closed to public access. Temporary fencing, along with signs, would be installed to prevent public access. Reclamation would coordinate with landowners or those holding special permits and other authorized parties regarding access to or through the project area.

9. Disturbed Areas--All disturbed areas resulting from the project would be smoothed, shaped, contoured, and rehabilitated to as near their pre-project construction condition as practicable. After completion of the construction and restoration activities, disturbed areas would be seeded at appropriate times with weed-free, native seed mixes. The composition of seed mixes would be coordinated with wildlife habitat specialists. Weed control on all disturbed areas would be required.

10. Environmental Commitment-- The Provo Area Office would ensure compliance with the environmental commitments and the environmental quality protection requirements.

12. Fisheries--If the proposed Echo SOD construction activities significantly reduce game fish populations due to reservoir water surface elevation restrictions, the reservoir's fishery would need to be restocked in coordination with the UDWR.

Chapter 5 – Consultation and Coordination

5.1 Introduction

This chapter details the consultation and coordination between Reclamation and other Federal, State, and local government agencies, Native American Tribes, and the public during the preparation of this EA. Compliance with NEPA is a federal responsibility that involves the participation of all of these entities in the planning process. NEPA requires full disclosure about major actions taken by Federal agencies and accompanying alternatives, impacts, and potential mitigation of impacts.

5.2 Public Involvement

Reclamation completed a public scoping process prior to beginning preparation of this EA. Scoping letters were mailed on February 8, 2005 to approximately 28 agencies, organizations and individuals inviting comments on the analyses to be included in the EA. Two scoping comment letters were received and determined to be outside the scope of the EA, because the proposed action is limited to construction and does not affect or propose any changes to operations. This draft EA will be distributed to approximately 28 individuals, organizations and agencies for review and comment.

5.3 Native American Consultation

Reclamation has conducted Native American consultation throughout the public information process. In April 2005 and May 2009, Reclamation transmitted a letter describing the proposed project (with maps) to Betsy Chapoose, Director of Cultural Resources for the Ute Tribe of the Uintah and Ouray Reservation, Fort Duchesne, Utah; and Patty Timbimboo-Madsen, Director of Cultural and Natural Resources for the Northwestern Band of the Shoshone Nation, Brigham City, Utah. This consultation was conducted in compliance with 36 CFR 800.2(c)(2), recognizing the government-to-government relationship between the Federal Government and Indian tribes. Through this effort, the tribe was given a reasonable opportunity to (1) identify any concerns about historic properties; (2) advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance; (3) articulate their views on the undertaking's effects on such properties; and (4) participate in the resolution of adverse effects.

5.4 Paleontology Resources

Paleontology file searches were requested from the UGS and received in August 2005 and May 2009. The UGS determined that unless fossils are discovered as a result of construction activities, this project should have no impact on paleontological resources.

Chapter 6 - Preparers

The following contributors to the Echo Dam SOD Modifications EA are employees of the U.S. Department of the Interior, Bureau of Reclamation, Provo Area Office.

Name	Position Title	Contribution
Brian Joseph, MA	Archaeologist	Cultural Resources; Paleontology
Peter Crookston, MS	Environmental Protection Specialist	NEPA Compliance
Troy Ethington, MS	Geographer	Mapping; Graphic Design
W. Russ Findlay, MS	Fish and Wildlife Biologist	Wildlife Resources, Vegetation, T&E Species
Beverley Heffernan, AB	Chief, Water and Environmental Resources Division	NEPA Compliance; Environmental Justice; Indian Trust Assets; Agency Review
Johnn Sterzer	Landscape Architect; Land Surveyor	Recreation
Linda Andra	Administrative Assistant	Technical Writing and Editing
Mike Draper	Engineering Draftsman	Geologic Section Maps
Greg Lott, BS	Geologist	Geology Drawings
Rafael A. Lopez, BA	General Biologist	Wetlands, CWA Compliance, 404 Permit
Denver		Safety of Dams Modification Report
Don Merrill	Public Involvement Specialist	Consultation and Coordination
Steve Noyes, MS, PE[a]	Civil Engineer	Water Quality
Scott Taylor, MS	Economist	Socioeconomics
Paul Christensen, PE[a]	Supervisory Civil Engineer	Design Review
Justin Record, PE[a]	Civil Engineer	Review of Water Rights
Ira Terry	Geologist	Geology Report
Lisa Verzella	Hydrologist	Water Resources and Operations
Gary Carlson, PE[a]	Supervisory Civil Engineer	Public Safety, Access, and Transportation

a = Registered Professional Engineer
b = Registered Landscape Architect

Chapter 7 - References

Blackshear, Barbara. 2005. *A Cultural Resource Inventory of the Echo Dam Safety of Dams Modification Project, Summit County, Utah.* On file at the Bureau of Reclamation, Provo Area Office, Provo, Utah.

Coulam, Nancy. 1998. *A Cultural Resource Inventory of a Proposed Safety of Dams Project, Echo Dam, Summit County, Utah.* On file at the Bureau of Reclamation, Provo Area Office, Provo, Utah.

U.S. Army Corps of Engineers. July 1971. Report on Reservoir Regulation for Flood Control, Weber Basin Reservoirs, Weber River and Tributaries, Utah. U.S. Army Corps of Engineers, _____ District Bureau of Reclamation, Upper Colorado Region.

U.S. Department of the Interior, Bureau of Reclamation. Bonneville Unit. Central Utah Project. Final Environmental Impact Statement, INT 73-42, 1973.

Utah Governor's Office of Planning and Budget, Location: [http://governor.state.ut.us/dea/demographics/2000_census_data_2000/census_data.html].

Utah's 2008 Integrated Report, Part 3 - 303(d) List of Impaired Waters, Department of Environmental Quality, Division of Water Quality, Salt Lake City, Utah