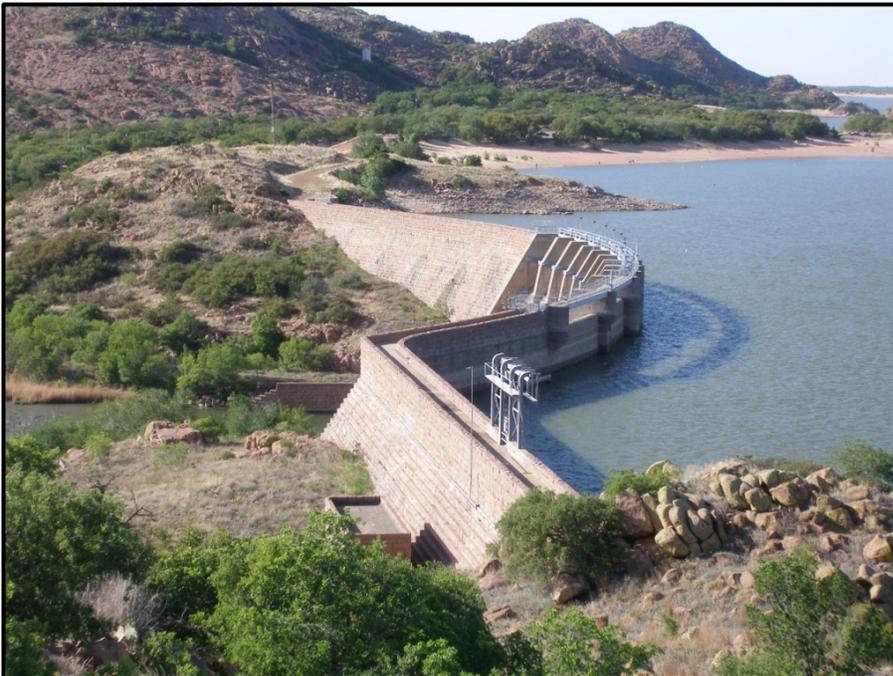


RECLAMATION

Managing Water in the West

W.C. Austin Project Safety of Dams Modification Finding of No Significant Impact and Environmental Assessment

**W.C. Altus Project, Oklahoma
Great Plains Region
15-02-OK-WCA**



**U.S. Department of the Interior
Bureau of Reclamation
Great Plains Region
Oklahoma-Texas Area Office**

February 2016

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.

FINDING OF NO SIGNIFICANT IMPACT

W.C. Altus Project, Oklahoma Great Plains Region

FONSI# 15-02-OK-WCA

PROPOSED ACTION

As part of Bureau of Reclamation's (Reclamation) Safety of Dams (SOD) Program, Reclamation is proposing to conduct modifications to the W.C. Austin Project. As described in the Environmental Assessment – W.C. Austin Project Safety of Dams Modification, the purpose of the proposed action is to maintain the authorized W.C. Austin Project purposes while reducing the risk of failure of the Altus dam or dikes, thereby reducing risk to public safety downstream to within acceptable limits established by the Reclamation SOD office. To meet this purpose, a Corrective Action Study (Reclamation, 2015) was completed that identified a need to cost-effectively reduce the probability of dam or dike failure under both static and hydrologic loadings. In accordance with Reclamation Policy (FAC-P02) and Interim Dam Safety Public Protection Guidelines, and based on multiple criteria such as Annualized Failure Probability, Annualized Life Loss, and Low Probability – High Consequence Events, the Altus CAS recommended the following preferred alternative:

1. Backfill the drainage trench with sand filters and a perforated drainage pipe encapsulated in gravel drain material at Lugert Dike and East Dike B
2. Raise all dikes to crest elevation 1573 above msl

These actions are necessary to correct unsafe conditions and to prevent possible loss of life, property, water storage and other project purposes due to potential failure modes (PFM) associated with internal erosion through the foundation of Lugert Dike and East Dike B and overtopping of all of the dikes. Approximately 200 dwellings located downstream of Altus Dam, Dikes and Reservoir could experience damage from releases greater than the safe channel capacity.

BACKGROUND

The U.S. Bureau of Reclamation Oklahoma-Texas Area Office (OTAO) has authorized the Lugert Altus Irrigation District (LAID) to operate and maintain the facilities in the W.C. Austin Project, including Altus Dam, Lugert-Altus Reservoir, and Dikes, as well as a canal system. The W.C. Austin Project is located on the North Fork of the Red River, about 18 miles north of the city of Altus, in Greer and Kiowa Counties, Oklahoma.

The W.C. Austin Project was authorized for construction by the Rivers and Harbors Act of June 28, 1938 (Stat. 1215, 1219) for the purposes of irrigation, flood control,

municipal and industrial services, fish and wildlife conservation, and recreation. The W.C. Austin Project provides irrigation water to the LAID and provides supplemental municipal and industrial (M&I) water to the city of Altus, Oklahoma.

National Environmental Policy Act of 1969 (NEPA) requires federal agencies to integrate environmental consideration into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. Based on the scope of the proposed project, it was determined that an EA would be necessary to evaluate impacts of the proposed project, and to determine whether, (1) a Finding of No Significant Impact (FONSI) may be issued or (2) impacts were significant and warrant preparation of an Environmental Impact Statement.

CONCLUSIONS OF FACT

Based on the evidence presented in the Final EA, Reclamation has drawn the following conclusions about the potential impacts of the proposed action:

1. Natural Resources and Unique Geographical Features

Temporary construction measures associated with dike modifications would not significantly affect the hydrology, quantity and/or timing of providing water supply for irrigation and municipal use. Normal reservoir operations are acceptable during construction, and it does not appear that reservoir operations need to be altered to facilitate reasonable construction or a reasonable schedule.

Temporary construction will not change the current uses of land in the area. Land will continue to be used for recreation, wildlife and agriculture. Borrow material would be obtained from designated areas on Reclamation lands.

Resource protection plans and construction procedures will be incorporated into the contract specifications which will ensure that disturbances to the surrounding environment area are minimized. All construction activities will be confined to designated construction areas. Disturbed areas would be contoured to blend in with the surrounding landscape and reseeded with a native grass mixture. Trees removed during construction would be replaced in accordance with a Reclamation-approved site restoration plan. Silt fences would be installed along the boundary of the area to prevent run-off onto private property. Quartz Mountain Nature Park will continue to be open year round. The North Dike extension is the only construction activity with the potential to directly impact recreation. During construction activities associated with the North Dike, the Live Oak campground would be closed temporarily while construction activities are occurring. In order to mitigate the recreational impact, construction activities at the North Dike are to take place outside of the peak visitor season, between

October and March, and be completed within 45 days.

2. Historical/Cultural Resources

The W.C. Austin Project is eligible for the National Register of Historic Places. The State Historic Preservation Office was consulted and concurred with Reclamation's finding that the proposed action would have no adverse effect on the W.C. Austin Project.

Reclamation will avoid and/or mitigate impacts on cultural resources in concurrence with the State Historical Preservation Officer and Oklahoma Archaeological Survey, thus no significant impacts are expected.

3. Controversial effects

The nature and extent of the potential impacts to the quality of the human environment from the proposed action are not controversial. Reclamation provided the opportunity to comment during the 30-day public comment period, none were received.

4. Public Health/Safety

The proposed action would reduce the risk of failure of the Altus Dam and dikes, thereby reducing risk to public safety downstream to within acceptable limits established by the Reclamation SOD office.

Reclamation's contractor will comply with all Reclamation Safety and Health Standards as stated in the specifications for the W.C. Austin Project Dike Modifications resulting in no significant public health or safety impacts. Construction-related impacts would be localized and temporary. Public health and safety in the project area would not be affected by the preferred alternative

5. Uncertain Impacts

Based on existing information, the nature and extent of the potential impacts to the quality of the human environment from the proposed action are known with a high degree of certainty, and that there are no unique risks associated with any aspect of the proposed action.

6. Precedent

The proposed action would not establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration.

7. Cumulative Impacts

The proposed action is not related to other actions with individually insignificant but cumulatively significant impacts.

8. Threatened or Endangered Species

There will be no effect on Federal or state listed threatened or endangered species or their habitats

9. Federal, State, Local, or Tribal Laws

Reclamation will obtain the Section 404 permit associated with the Auxiliary Dike. As needed, Clean Water Act Section 401, 402, and 404 permits would be obtained from the United State Army Corps of Engineers. A National Pollutant Discharge Elimination System Construction Stormwater Discharge permit would also be obtained from the Oklahoma Department of Environmental Quality. The Contractor will obtain all necessary permits, unless otherwise stated, and permits must be acquired prior to construction activities. As a result no Federal, State, or local laws will be violated

10. Indian Trust Assets

The proposed action would not affect tribal water rights or Indian Trust Assets.

11. Socioeconomics/Environmental Justice

Construction activities are expected to bring some positive economic benefit to the area in that construction as workers would utilize nearby towns, such as the City of Altus to acquire goods and services. Allocated costs for construction would be recovered according to the SOD Act and other Reclamation laws.

No significant natural resource or socioeconomic impacts adversely affecting minority and low-income populations have been identified. Therefore, there are no environmental justice impacts.

12. Sacred Sites

Affiliated tribes associated with the project area were consulted and no response was received. Therefore, the proposed project would have no affect Indian sacred sites.

13. Noxious or Invasive weeds

To reduce the potential for the introduction of noxious weeds, all equipment will be cleaned with pressure washing prior to operating. Removal of all dirt, grease,

and plant parts that may carry noxious weed seeds or vegetative parts is required and may be accomplished off site with a pressure hose.

All seed, hay, straw, mulch, or other vegetation material transported and used in the disturbed areas must be free of noxious weed seeds as certified by a qualified federal, state, or county officer.

Reclamation's contractor will be held accountable if new invasive species are introduced into the disturbance areas due to improper cleaning of equipment.

14. Climate Change

Methodologies utilized as part of the risk assessment demonstrated no significant climate change impacts associated with proposed alternative.

FINDING OF NO SIGNIFICANT IMPACT

Based on the evidence presented and upon the conclusions of fact presented above, Reclamation has determined that the proposed action would not individually or cumulatively have significant effects on the quality of the human environment; therefore, an Environmental Impact Statement is not warranted.

Approved: Mark A. Treviño
Mark A. Treviño, Area Manager

Date: 2/9/16

RECLAMATION

Managing Water in the West

Environmental Assessment

W.C. Austin Project Safety of Dams Modification



*Oklahoma Texas Area Office
Great Plains Region*



U.S. Department of the Interior
Bureau of Reclamation

February 2016

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Acronyms and Abbreviations

APE	Area of Potential Effect
BMPs	Best Management Practices
CAS	Corrective Action Study
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
CR	Comprehensive Review
CWA	Clean Water Act
EFRR	Elm Fork of the Red River
EA	Environmental Assessment
EO	Executive Order
HDPE	High Density Polyethylene
ITA	Indian Trust Assets
M&I	Municipal and Industrial
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
NAGPRA	Native American Graves Protection and Repatriation Act
NFRR	North Fork of the Red River
ODEQ	Oklahoma Department of Environmental Quality
ODHE	Oklahoma Department of Higher Education
ODWC	Oklahoma Department of Wildlife Conservation
OTAO	Oklahoma Texas Area Office
PFM	Potential Failure Mode
PMF	Probable Maximum Flood
Reclamation	Bureau of Reclamation
SOD	Safety of Dams
SHPO	State Historic Preservation Office
SWPPP	Storm Water Pollution Prevention Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WMA	Wildlife Management Area

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INTRODUCTION

The U.S. Bureau of Reclamation's (Reclamation) Oklahoma-Texas Area Office (OTAO) has authorized the Lugert Altus Irrigation District (LAID) to operate and maintain the facilities in the W.C. Austin Project, including Altus Dam, Lugert-Altus Reservoir, and Dikes, as well as a canal system. The W.C. Austin Project is located on the North Fork of the Red River, about 18 miles north of the city of Altus, in Greer and Kiowa Counties, Oklahoma.

The W.C. Austin Project was authorized for construction by the Rivers and Harbors Act of June 28, 1938 (Stat. 1215, 1219) for the purposes of irrigation, flood control, municipal and industrial services, fish and wildlife conservation, and recreation. The W.C. Austin Project provides irrigation water to the LAID and provides supplemental municipal and industrial (M&I) water to the city of Altus, Oklahoma.

A. Purpose and Need

The purpose of the proposed action is to maintain the authorized W.C. Austin Project purposes while reducing the risk of failure of the Altus dam or dikes, thereby reducing risk to public safety downstream to within acceptable limits established by the Reclamation SOD office. To meet this purpose, a Corrective Action Study (Reclamation, 2015) was completed that identified a need to cost-effectively reduce the probability of dam or dike failure under both static and hydrologic loadings. In accordance with Reclamation Policy (FAC-P02) and Interim Dam Safety Public Protection Guidelines, and based on multiple criteria such as Annualized Failure Probability, Annualized Life Loss, and Low Probability – High Consequence Events, the Altus CAS recommended the following preferred alternative:

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These actions are necessary to correct unsafe conditions and to prevent possible loss of life, property, water storage and other project purposes due to potential failure modes (PFM) associated with internal erosion through the foundation of Lugert Dike and East Dike B and overtopping of all of the dikes. Approximately 200 dwellings located downstream of Altus Dam, Dikes and Reservoir could experience damage from releases greater than the safe channel capacity.

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations (CFR) Parts 1500-1508), the U.S. Department of the Interior regulations for the Implementation of the NEPA (43 CFR Part 46) and the Reclamation Manual policy for implementation of the NEPA (ENV P03). The EA analyzes the potential direct, indirect, and cumulative environmental impacts associated with the proposed project to correct safety deficiencies at Altus dikes.

B. Safety of Dams (SOD) Program Overview

Reclamation is responsible for about 476 storage dams and dikes that form a significant part of the water resources infrastructure for the 17 western United States. The objective of the Reclamation SOD Program is to: (1) ensure that these Reclamation facilities do not present unreasonable risks to the public, public safety, property, and/or the environment; and (2) to take appropriate action to reduce and manage risks in an efficient and cost effective manner.

The modifications proposed for the dikes at Altus Dam are authorized by the Reclamation Safety of Dams Act of 1978 (Public Law 95-578) and the Reclamation Safety of Dams Act Amendments of 1984 (Public Law 98-404), 2000 (Public Law 106-377), 2001 (Public Law 107-117), and 2004 (Public Law 108-439). Together, these are referred to as the Safety of Dams Act.

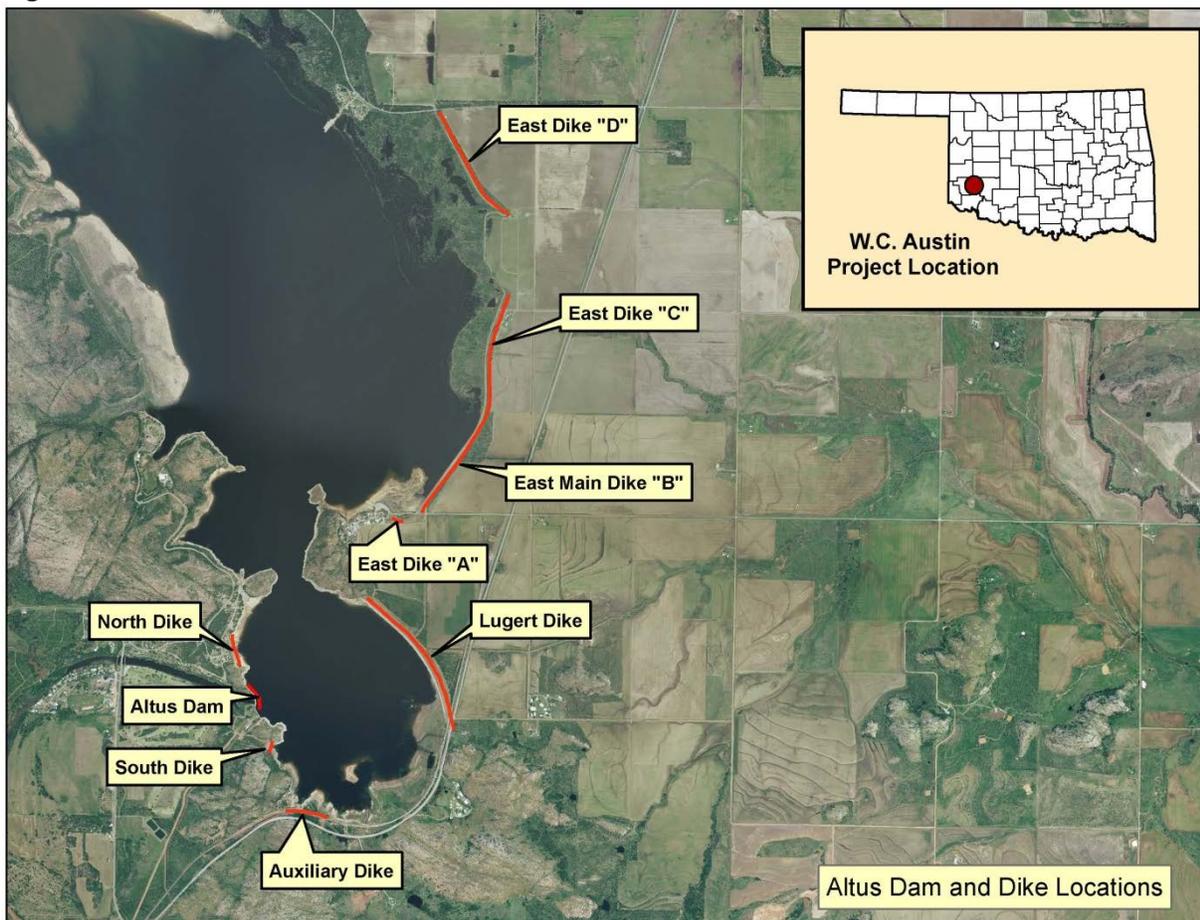
The SOD program focuses on evaluating and implementing actions to resolve safety concerns at Reclamation dams. Under this program, Reclamation would complete studies, identify, and accomplish needed corrective actions on Reclamation dams. The selected course of action relies on assessments of risks and liabilities with environmental and public input to the decision-making process.

Reclamation uses two guidelines to assess dam safety risk. The first guideline addresses Annualized Failure Probability, which serves to fulfill the public trust responsibility associated with agency exposure because of dam failures (dams should not fail frequently even if the consequences are low). The second guideline addresses Annualized Life Loss, where multiple fatalities are possible as the result of dam failure. Protection of human life is of primary importance to public agencies constructing, maintaining, or regulating public works (Reclamation, 2006).

C. Location

The W.C. Austin Project consists of the Altus Dam, five dikes, the reservoir, and a canal system that delivers irrigation water to the Lugert-Altus Irrigation District (LAID) (Figure 1). Construction of Altus Dam was completed by Reclamation in 1945. The project is located on the North Fork of the Red River about 18 miles north of the town of Altus, Oklahoma. The W.C. Austin Project was authorized for construction by the Rivers and Harbors Act of June 28, 1938 (Stat. 1215, 1219) for the purposes of irrigation for approximately 48,000 acres of privately owned land in southwestern Oklahoma, flood control on the North Fork of the Red River, an augmented municipal water supply for the city of Altus, fish and wildlife conservation benefits, and recreation. Irrigation water is provided to the LAID, and Municipal and Industrial (M&I) water is provided to the city of Altus.

Figure 1. Altus Dam and Dike Locations



Five earthfill dikes were constructed at low points around the reservoir rim: North Dike, South Dike, Lugert Dike, East Dikes (A, B, C, and D), and the Auxiliary Dike. East Dikes A, C, and D are considered freeboard dikes, which only retain water during high

water events, and there is no documentation of water ever having been on the dikes. Each dike has the same type of construction, except the Auxiliary Dike, which does not have a cutoff trench. The dikes were generally constructed of clay, sand, and gravel compacted in 6-inch layers. All of the dikes are homogenous structures, which do not contain filters. The homogenous design of the dikes provides an unfiltered exit for seepage, which can reduce internal erosion, and particle movement on the downstream face. A summary of the design crest elevations, surveyed crest elevations and crest length for each dike is provided in Table 1 below:

Table 1. Survey Elevations of Structures at Lugert-Altus Reservoir

Structure	Design Crest Elevation	Surveyed Crest Elevation		Height of Dike (feet)	Dike Crest Width (feet)	Crest Elevation used in Routings (feet)	Crest Length Used in Routings (feet)
		Minimum Elevation	Maximum Elevation				
Crest of Gated Spillway	1547 - Crest 1562 – Top of Gates						
Crest of Ungated Spillway	1559						
Dam Crest	1564						
Dam Parapet Wall	1566.67						
Northwest Saddle	1567						
Auxiliary Dike	1569	1567.61	1569	23	20 - 24	1568.5	1,867*
Lugert Dike	1571	1570.07	1571.15	47	24	1570.6	4,220
South Dike	1571	1570.77	1572.49	35	24	1571.7	330
North Dike	1571	1571.41	1571.82	27	24	1571.8	1,100
East Dike A	1571	1571.38	1571.90	10	24	1571.9	435
East Main Dike B	1571	1570.66	1571.58	27	24	1571.0	4,420
East Dike C	1571	1570.84	1571.56	9	24	1571.2	2,150
East Dike D	1571	1570.67	1571.82	9	24	1571.3	3,600

Background

Reclamation completed a risk analysis of the W.C. Austin Project facilities in 1998. As an outcome of the 1998 risk analysis, recommendations were made to collect additional data and perform additional analyses. A subsequent risk re-evaluation was performed in 2006 based on this additional data and analyses. This risk analysis (Reclamation,

2006) identified risks above Reclamation's Public Protection Guidelines (Reclamation 2006a) for static, seismic, and hydrologic loadings. This risk analysis estimated that the annualized failure probability for hydrologic loading, resulting in overtopping, indicates that there is justification to implement risk reduction actions for North, South, Auxiliary, Lugert, and East Dikes. Overtopping of the dikes during remote hydrologic loadings would occur after Altus Dam is overtopped; however, overtopping of the concrete, masonry Altus Dam is not expected to result in failure of the dam.

The 2006 risk analysis also determined that there is increasing justification to take action to reduce static risks for Lugert Dike and East Dike B. This is due to the presence of downstream drainage trenches at Lugert Dike and East Dike B, which are unfiltered seepage exit locations for the PFM of internal erosion through the foundation. Static risks associated with internal erosion through the embankment at North and South Dikes were determined to have diminishing justification to take action to reduce risks.

A Comprehensive Review (CR) completed in 2012 (Reclamation, August 2012) concurred with the findings of the 2006 risk analysis. Following the CFR, Reclamation performed a CAS to evaluate corrective actions in order to reduce probability of failure under static and hydrologic loadings at dikes. The resulting Altus CAS, completed in May 2015, identified various alternatives to: 1) reduce static and hydrologic risks associated with the Altus dikes, 2) ensure continued structural integrity under all reasonable expected operating conditions, 3) reduce potential flood overtopping risks, and 4) fully maintain authorized project benefits at current levels.

1. Alternatives

The SOD risk analysis process (as described) identified dike deficiencies. Deficiencies include failure of Lugert Dike and East Dike B due to internal erosion through the foundation and overtopping of the dikes during an extreme flood event. A wide range of alternatives were evaluated as potential corrective actions for the identified dike deficiencies.

The No Action alternative and CAS preferred alternative, selected by the Dam Safety Advisory Team, are described below followed by a brief description of other alternatives evaluated but eliminated from further consideration.

A. No Action Alternative

Under this alternative, no Federal action would be taken to correct safety deficiencies at

Altus Dikes. Operation of the dam would continue in accordance with applicable procedures with no improvements to handle extreme flood events. Thus, during an extreme flood event, the dikes at Altus Dam would be overtopped by floodwater resulting in dike failure. Under the No Action alternative, the downstream population would continue to live with elevated risk of dike failure during a significant hydrologic event. Reclamation considers the No Action alternative to be unacceptable for the long-term safety of Altus Dikes and populated areas downstream.

The No Action alternative generally represents the current conditions without the CAS preferred alternative. The evaluation of a No Action alternative is required in order to evaluate the effects of the CAS preferred alternative to current conditions under NEPA.

B. CAS Preferred Alternative

Under the CAS preferred alternative, Reclamation would secure and administer a 2-year construction contract for the approved modification and modify the W.C. Austin repayment contract to modify the dikes at Lugert-Altus Reservoir, reducing the static and hydrologic risks to an acceptable level as defined by Reclamation's SOD Program. Reclamation's SOD Program is further detailed in Section B of the Introduction. To address static risks associated with internal erosion through the foundation at Lugert Dike and East Dike B, the following is proposed:

- Backfill the drainage trench with sand filters and a perforated drainage pipe encapsulated in gravel drain material at Lugert Dike and East Dike B

To address hydrologic risks associated with the dikes at Lugert-Altus Reservoir, the following is proposed:

- Raise all dikes to crest elevation 1573 above msl

Internal erosion from the foundation of Lugert Dike and East Dike B into the drainage trenches downstream of the respective dikes has been identified as being above Reclamation's Dam Safety Public Protection guidelines. To reduce these static risks, the existing drainage trenches downstream of Lugert Dike and East Dike B would be cleaned out, and backfilled with sand filter material that meets Reclamation's filter design for foundation material. The trench excavation includes 2:1 upstream slopes and 4:1 downstream slopes. In the center of the trench, a gravel drainage zone would be placed that encapsulates an 8-inch-diameter high density polyethylene (HDPE) perforated pipe. The gravel drain would be designed to meet Reclamation's permeability and filter criteria for filtering the filter sand and be sized to keep the gravel from flowing through the perforations of the HDPE drainage pipe. In addition to the

drainage features, a weir box would be constructed at the downstream end of East Dike B toe drain to allow monitoring of flow coming through and under East Dike B. Downstream of the weir box, a solid (non-perforated) HDPE pipe would be buried in the existing ditch that conveys drainage flows from East Dike B to a manhole just downstream of the middle of Lugert Dike. See Figure 2, showing the Trench Filter design.

At the junction of the right and left toe drains at Lugert Dike, a manhole would be installed with weirs to measure flows from the right and left toe drains at Lugert Dike as well as flows from East Dike B. At each upstream end of the toe drain, a clean-out would be installed to allow cleaning of the toe drains and to provide access for future video camera inspections. Additional access for cleaning and video inspections of the toe drain would be designed into the weir box at the downstream end of East Dike B toe drain, and at the manhole for the Lugert Dike toe drains.

Borrow of miscellaneous fill would be acquired from designated borrow areas and used to fill the existing trenches at Lugert Dike and East Dike B. A 2.5 to 4.5 ft. deep surface drainage trench with 4:1 side slopes is shaped in the miscellaneous fill to reduce the amount of fill needed. The flatter slopes would facilitate trench maintenance (such as mowing).

Raising each dike to crest elevation 1573 addresses hydrologic risks and mitigates dike failure due to overtopping. This represents a 4-ft raise for the Auxiliary Dike and a 2-ft raise for all other dikes. The designs for the dike raises consist of over-steepening the upper portion of the dikes to limit the amount of work on the upstream and downstream faces, see Figure 3. The existing gravel surface would be removed and the 24-ft wide crest would be scarified. The construction design consists of 16-ft wide crests constructed by installing riprap and bedding protection on the new raised upstream slope and rockfill on the new raised downstream slope.

Figure 2. Altus Dikes - Trench Filter CAS preferred alternative

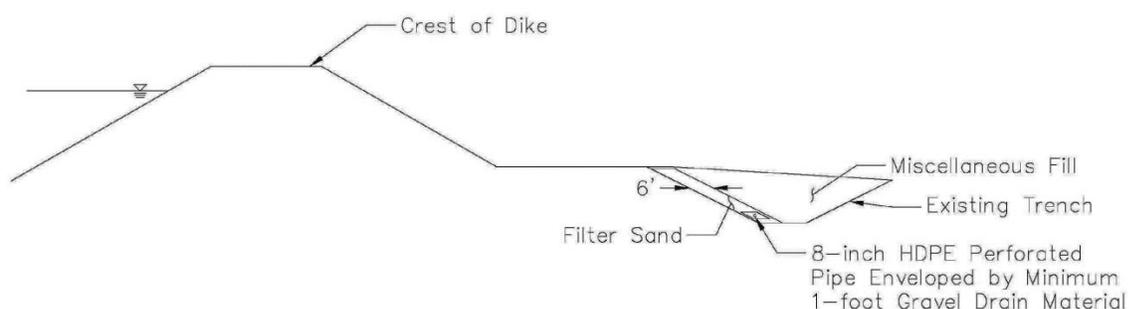
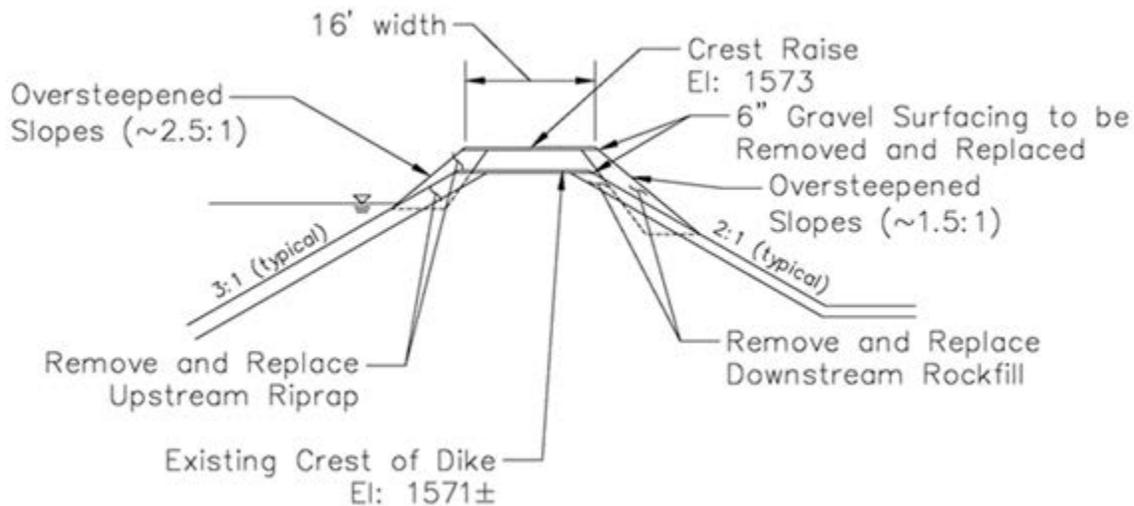


Figure 3. Altus Dikes - Dike Raise CAS preferred alternative



Borrow material needed to raise the crest for each dike would be obtained from designated borrow areas located on Reclamation property. Borrow areas are predominately covered with mesquite, American elm, cottonwoods, hackberry, and Johnson grass. Existing vegetation would be removed and disposed of properly. Once construction is complete, the disturbed areas would be contoured to blend in with the natural grade and reseeded with native grass seed. Trees that are removed would be replaced with similar vegetation. These areas would be restored back to pre-construction conditions as much as possible.

To preserve as much of the natural environment as possible, the contractor is only allowed to remove material from three of the eight identified soil borrow areas. If the contractor is unsuccessful in obtaining the necessary amount of material needed to complete the project, a justification to Reclamation stating why an additional borrow area is needed.

The proposed borrow areas located upstream of East Dike C extends within the conservation pool. In the event material from this borrow area is used, a Section 404 permit must be obtained from USACE prior to removal.

Approximately 0.3 acres of land would be used during construction as a contractor staging area. The proposed contractor staging area is located adjacent to the borrow area below Lugert Dike.

The contractor will utilize approved access roads as needed to accomplish construction work. These access roads are primarily existing roads that are routinely used by LAID

for operation and maintenance of dikes. Access roads that are damaged during construction would be repaired and restored to pre-construction conditions. To minimize dust, the contractor is required to employ dust abatement procedures (such as watering).

Prior to construction, modification to some utilities will occur in particular areas in and around the project area. A power pole and overhead power line located on South Dike would need to be removed and relocated. Power poles and power lines near East Dike D will be relocated to parallel the North Shore Road. Additional power poles will be installed near the Dike Road adjacent to East Dike C to allow height clearance for construction equipment.

Construction of this alternative is proposed to run for an estimated two years from September 2016 through June 2018. All potential disturbance areas are shown on Figure 4.

C. Alternatives Considered but Eliminated from Further Study

Downstream Chimney Filter with Drainage Trench Backfill

This alternative involves all of the features described in the CAS preferred alternative, but it also includes the addition of a sand chimney filter on the downstream faces of Lugert Dike and East Dike B. The purpose of the added chimney filter feature is to intercept any seepage that travels through the dikes and safely convey it to the new toe drain.

This alternative is intended to address the critical failure modes associated with internal erosion through the embankment and foundation at Lugert Dike and East Dike B. The baseline risks for internal erosion through the embankment are already below Reclamation's guidelines. Therefore, Reclamation eliminated this alternative because risk reduction for this failure mode is not needed.

Soil Bentonite Cutoff Wall

The soil bentonite cutoff wall alternative involves constructing soil bentonite cutoff walls through the crests of Lugert Dike and East Dike B. These cutoff walls would be excavated through the foundations of the dikes 3 feet into the bedrock beneath the dikes. The cutoff wall creates an impermeable barrier that would cutoff any seepage through the embankment and foundations of the dikes. This alternative likely requires a specialty contractor for construction of the cutoff wall. If not constructed properly, a flaw might occur in the wall or the wall might not be properly tied into an impermeable layer in the foundation, which would not create a completely impermeable barrier. This alternative reduces risk associated with internal erosion through the foundation at Lugert and East Dike B, both below Reclamation's guidelines, but does not reduce risk as low as the CAS preferred alternative. Therefore, this alternative does not meet the purpose and need and was eliminated from further evaluation.

Reservoir Restriction

The reservoir restriction alternative involves placing permanent operating restrictions on the reservoir, which would reduce risks associated with static and hydrologic-induced overtopping. This alternative is not viable because it would have a significant negative impact on the beneficiaries of the dam by greatly reducing the reservoir capacity and in turn, reducing the ability of the facility to meet irrigation and municipal and industrial demands to the communities downstream. Therefore, this alternative does not meet the purpose and need and was dropped from further evaluation.

Dam Breach

The dam breach alternative eliminates the risk of dam failure; it would also result in complete loss of all the benefits provided by the reservoir. Most significant among the lost benefits are the M&I and irrigation benefits for communities downstream, but other lost benefits include recreational, environmental, and additional economic benefits. This alternative was also very costly due to removal of the dam and stabilization of the sediments within the reservoir. Therefore, this alternative does not meet the purpose and need and was eliminated from further evaluation.

Structural Alternatives

Several structural alternatives were evaluated to meet the Safety of Dams deficiencies. Alternatives included:

- Re-establish Auxiliary Dike to Elevation 1569, and Raise All Other Dikes to 1573
- Raise East Dike D to Elevation 1573, All Other Dikes to Elevation 1574
- Re-establish Auxiliary Dike to Elevation 1569, and Raise All Other Dikes to 1573
Add New 2000-ft Northwest Saddle Spillway at Elevation 1564

These alternatives resulted in only slightly greater risk reduction at substantially higher total project costs as compared to the CAS preferred alternative. Allowing one of the dikes to be lower, as was proposed by these alternatives, was not an acceptable alternative because they did not achieve the required total risk reduction. Therefore, this alternative does not meet the purpose and need and was eliminated from further evaluation.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter addresses the existing environment and the environmental consequences of the No Action alternative and CAS preferred alternative. Environmental effects associated with backfilling the drainage trench with sand filter at Lugert Dike and East Dike B and raising all dikes to a crest elevation 1573.

A. Water Resources

Lugert-Altus Reservoir, Dam and Dikes are located at river mile 73.5 on the North Fork of the Red River. The Altus Dam drainage basin is described as generally rolling with medium to coarse textured soils. The drainage basin above Altus Dam lies in the panhandle of Texas and southwestern Oklahoma. Downstream of Altus Dam, the river flows to the south and into the Red River near Vernon, Oklahoma. The total basin relief

is approximately 1,980 ft. with the highest elevations in the headwaters of about 3,450 ft. and the lowest elevations of about 1470 ft. near Altus Dam (Reclamation, 2012).

The Lugert-Altus Reservoir has a total capacity of 154,092 ac-ft. at reservoir elevation 1562.0 ft. (top of the exclusive flood control capacity), of which 1663 ac-ft. are dead storage. 19,597 ac-ft. of flood control storage and 132,832 ac-ft. are conservation storage. At elevation 1559.0 ft. (top of active conservation), the reservoir has a surface area of 6,260 acres and a storage capacity of 134,495 ac-ft.

Water is delivered through a system of canals and laterals having a total length of 270 miles. The delivery system's primary conveyance features are the Main, Altus, West and Ozark Canals. Water is diverted into the Main Canal at Altus Dam through three 5x5 ft. high-pressure gates, and is then transported 4.2 miles to the northern boundary of the LAID irrigable lands. The Main Canal crosses the North Fork of the Red River (NFRR) by means of an inverted siphon, and bifurcates in the Altus and West canals.

The dam is operated and maintained by the LAID in Altus, Oklahoma. The LAID normally irrigates about 48,000 acres. Under the LAID's operation of Altus Dam and Reservoir, irrigation releases are typically from June through September. These releases are determined by irrigation demand and storage capacity.

Release procedures for flood control operation during storage between elevations 1559 ft. and 1562 ft. are directed by the U.S. Army Corps of Engineers (USACE), Tulsa District in coordination with the OTA/O of the Bureau of Reclamation. When the reservoir water surface elevation exceeds the top of the flood pool at elevation 1562 ft. and enters the surcharge storage, Reclamation is responsible for directing releases.

The Oklahoma Department of Environmental Quality (DEQ) has listed Lugert-Altus Reservoir on its 2014-303(d) list (which refers to section 303(d) of the Clean Water Act (CWA)) of Category 5 (impaired) waterbodies. DEQ develops plans with goals and pollution control targets for improving water quality where minimum standards are not met. The Lugert-Altus Reservoir is listed due to its turbidity level not meeting the minimum standards required by DEQ. The source of the high turbidity level is unknown.

Environmental Consequences

No Action Alternative. Under the No Action alternative, all dikes would remain at their current elevations and risks would stay above Reclamation Public Protection guidelines. No construction would occur and water quality would continue unchanged.

The potential consequences that could result under the No Action Alternative include the following:

Should an extreme flood event occur which causes the dikes to fail, recreational,

industrial, and residential areas could become inundated by floodwaters. The population at risk is dependent upon which of the structures fail and the type of failure.

There are approximately 16 resident farmsteads located east of Lugert and East Dikes that could be inundated as the result of either dike failing [4]. Failure of North Dike would inundate Quartz Mountain Nature Park’s Scissortail Campground camping facilities.

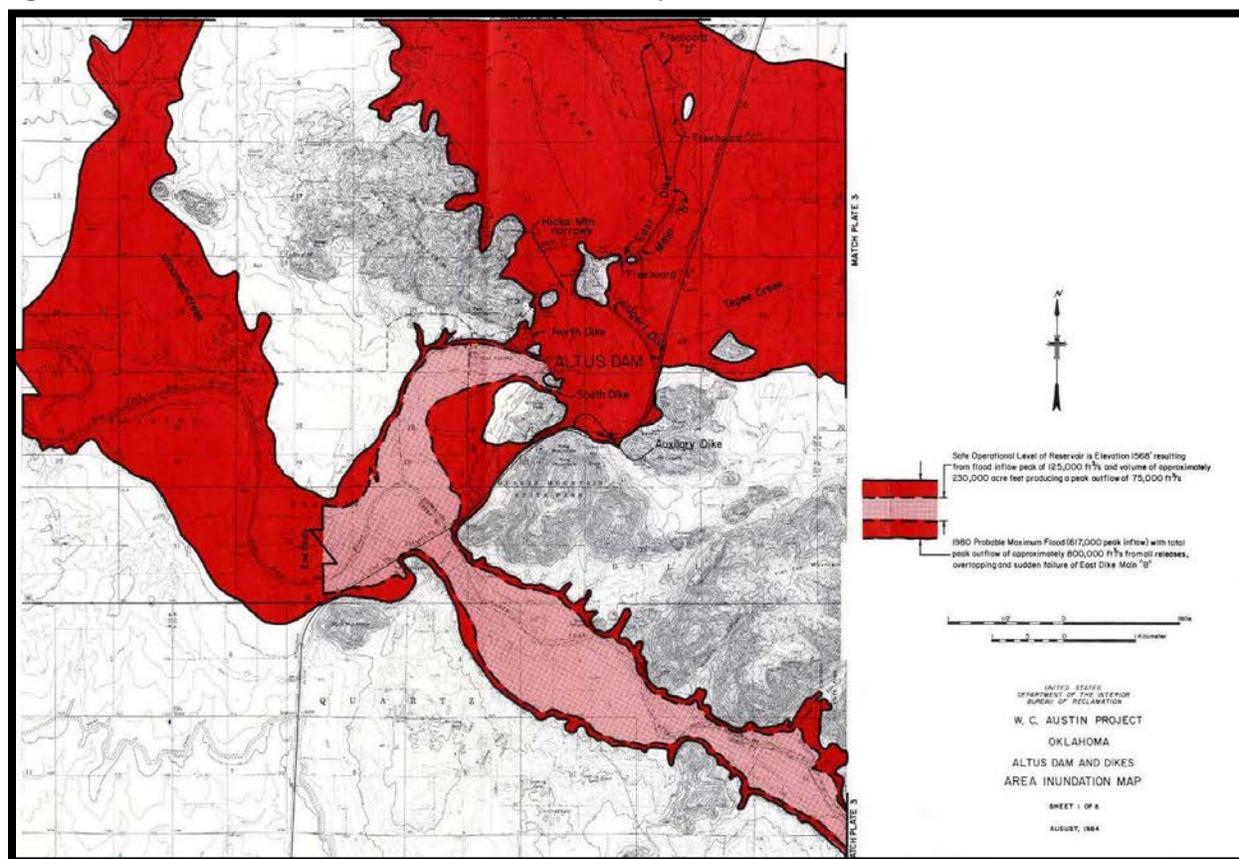
Approximately 200 dwellings are located downstream of Altus Dam, Dikes, and Reservoir that could be impacted if dike failure occurred under the Probable Maximum Flood (PMF) scenario which would involve releases greater than the safe channel capacity of 5,400 ft³/s. The risk to populations is summarized in Table 2.

Table 2. Estimated Population at Risk for Altus Dam Structures (Reclamation, 2015)

Failure Type	Altus Dam	North Dike	South Dike	Lugert Dike	East Dike
Static or Seismic	462	244	142	236	236
Flood	400	142	142	100	100

Overtopping of the dam occurs when the reservoir exceeds the top of the parapet wall at elevation 1566.67 ft. See Figure 5 showing the Altus Dam and Dikes Area Inundation Map.

Figure 5. Altus Dam and Dikes Areas Inundation Map



The Northwest Saddle overtops at reservoir elevations greater than approximately 1567 ft. Flows would run across cultivated lands before entering the Elm Fork of the Red River (EFRR).

When the reservoir exceeds elevation 1569 ft., overtopping of the Auxiliary Dike occurs and flood flows would flow along the railway alignment and enter the NFRR near the confluence with the EFRR. For floods exceeding approximate reservoir elevation 1570 ft., East and/or Lugert Dikes overtop, resulting in flooding downstream of the dikes, then into Teepee Creek, which enters the NFRR about seventeen miles downstream of the dam. Overtopping of North and South dikes occurs when the reservoir elevation exceeds approximately 1571 ft.

CAS Preferred Alternative. Under the CAS preferred alternative, raising all dikes to crest elevation 1573 ft. above msl, which entails raising the Auxiliary Dike 4ft., reduces the hydrologic risk by increasing the flood surcharge volume of the reservoir allowing a greater portion of the flood inflows to be stored. Raising the dikes would not increase the conservation pool storage. Under this alternative, all dikes would be in compliance with Reclamation Public Protection guidelines.

Temporary construction associated with dike modifications would not significantly affect the hydrology, quantity and/or timing of providing water supply for irrigation and municipal use. Normal reservoir operations are acceptable during construction, and it does not appear that reservoir operations need to be altered to facilitate reasonable construction or a reasonable schedule. Approximately 40% of the years between 1947 and 2013 had reservoir levels greater than elevation 1545 ft. between August and December.

Raising all dikes to crest elevation 1573 ft. may have temporary impacts on water quality. Sedimentation and runoff from construction activities could enter the reservoir. Reclamation would require the contractor to obtain a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Discharge Permit. This NPDES permit applies to projects that disturb one or more acres of soil, or projects that disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres. The NPDES permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). The SWPPP must include ODEQ-approved Best Management Practices (BMPs) to minimize impacts of sedimentation and runoff associated with construction activities from entering the reservoir. There would be no long-term impact on water quality in the Lugert-Altus Reservoir as there would be no foreseeable change in reservoir operations. With the exception of the Auxiliary Dike and the borrow area upstream of East Dike C, a permit under Section 404 must be obtained from the USACE and follow any BMPs or mitigation measures. All permits must be acquired prior to construction activities.

B. Socioeconomics

Altus Dam and Dikes are located in Greer and Kiowa Counties, approximately 18 miles north of the city of Altus in southwestern Oklahoma. Access to the dam and dikes are made by traveling on Highway 283 for 12 miles, then take Highway 44 for approximately 7 miles.

Altus, OK is the county seat of Jackson County. It had a population of approximately 20,000 in 2014. Altus serves over 80,000 people as an economic hub for the Southwestern Oklahoma Region.

Altus has several businesses and community services, such as Altus Air Force Base, a hospital, hotels, convenience stores, shopping centers, churches, gas stations, restaurants, beauty shops, senior center, public schools, library, post office, and museums.

Agriculture, including ranching, is one of the principal economic activities in the area with recreation and tourism being very important as well. Wheat, cattle and cotton have

long been agricultural staples to Southwest Oklahoma. Jackson County, which encompasses the City of Altus and the surrounding area, is the highest cotton-producing county in the State of Oklahoma (Altus Chamber of Commerce).

Oklahoma Department of Higher Education (ODHE) administers the recreational lands as Quartz Mountain Nature Park, with the majority lying on the southern half of the reservoir. Quartz Mountain Nature Park, which is open year round, consists of a conference center, campgrounds, lodge, and cabins. This area is further addressed in the Recreation section of this document.

Contract Number Ilr-1375 authorizes LAID to supply water for irrigation to approximately 48,000 acres and supply 4,800 acres feet of M&I water to the City of Altus.

The SOD Act requires that 15% of the total costs incurred in dam safety modifications, which are determined to be necessary due to new hydrologic or seismic data or changes in the state-of-the-art criteria deemed necessary for safety purposes, to be allocated to the authorized reimbursable purposes of the structure based on the annual benefits and annual operation and maintenance costs for each identified purpose. Reimbursable benefits for Altus Dam and dikes are irrigation and municipal water.

Environmental Consequences

No Action Alternative. Under the No Action alternative, there would be no change to the existing financial conditions in the area.

The potential consequences that could result under the No Action alternative include the following:

Should Altus Dam and dikes be threatened with an extreme flood event and failure, warnings would be issued through the media, emergency systems, personnel and all other entities adjacent to the site before the dikes fail. Though populations below Altus Reservoir would be made aware that dam failure and flooding is eminent, there would likely be some loss of life. The loss of life estimates for a static and hydrologic failure during an extreme flood event is listed in Table 3.

Table 3. Altus Structures Loss of Life Estimates (Reclamation, 2015)

Structure	Static (mean)	Seismic (mean)	Flood (mean)
Altus Dam	7 to 69 (38)	7 to 69 (38)	1 to 14 (7)
North Dike	2 to 26 (14)	2 to 26 (14)	0 to 1 (1)
South Dike	0 to 2 (1)	0 to 2 (1)	0 to 1 (1)
Lugert Dike	0 to 4 (2)	0 to 4 (2)	0 to 1 (1)
East Dike	0 to 4 (2)	0 to 4 (2)	0 to 1 (1)
Auxiliary Dike	0 to 1 (1)	0 to 1 (1)	0 to 1 (1)

Should Altus Dikes fail, property damage and lost project benefits would be substantial. It is estimated that the failure of the dikes would result in property and infrastructure damages of \$574.4 million. The estimate does not include the cost of emergency services, environmental damages, disruption of government services, clean-up, or disruption of people’s lives. See Table 4 for a breakdown of the estimated damages.

Table 4. Estimated Damages Summary (million \$) (Reclamation, 2015)

Property Category	Altus Dike Failure Damages
Building-Related Losses	\$49.4
Transportation	\$381.9
Essential Facilities	\$0
Utilities and Other Infrastructure	\$90.8
Vehicles	\$4
Agriculture	\$48.3
Total	\$574.4

Altus Dam, including the five earthen dikes, has been classified as a high hazard facility, according to FEMA Federal Guidelines for Dam Safety (FEMA-333, 2004). Failure of the dam or dikes has the potential to inundate recreational and residential areas downstream. A flood failure of Altus Dam, North Dike, South Dike, and/or Auxiliary Dike would send flows to the west side of the reservoir, eventually making its way into the river channel south of the reservoir. A flood failure of Lugert Dike and/or East (A, B, C, and/or D) Dike would send flows to the east side of the reservoir.

Lost project benefits include irrigation, recreation, M&I water supply, and flood control benefits. Without Lugert-Altus Reservoir, approximately 85,630 acre-feet of irrigation water and 4,800 ac-ft. of M&I water a year would not be available for delivery.

The overtopping and failure of Altus Dam and Dikes would result in extensive

environmental damage to the ecosystem from Altus Dam on the North Fork of the Red River to the confluence of the Elm Fork on the Red River. Extensive turbidity, siltation, debris flow and destruction of vegetation would occur along the flood pathway. In addition to environmental damage, infrastructure damage would also occur. There would be impacts to power lines, railroad lines, and roads. These foreseeable impacts would result in a substantial economic burden for the area.

CAS Preferred Alternative. The influx of construction workers may provide some temporary economic benefits as construction workers may utilize nearby towns, such as the City of Altus. These construction workers would likely acquire services in the form of hotels, apartments, other rentals, and trailer campgrounds, as well. Temporary employment opportunities may develop for local residents such as for equipment operators and laborers.

Quartz Mountain Nature Park would continue to be open year round. The Park may temporarily experience effects to recreation associated with construction although most of the recreation areas are expected to remain open.

The preliminary estimates calculate the total capital cost of this alternative is approximately \$23 million. There are no impacts to authorized project purposes associated with this alternative. In accordance with the SOD Act, 15% of the total costs for modifications are allocated to the authorized reimbursable purpose of the project and are to be repaid by the contracting entities (LAID and City of Altus). Reclamation would modify the contract for the repayment of the reimbursable costs associated with the modification under the SOD Act. Based on the \$23 million estimated capital cost of this alternative, the estimated repayment obligation is approximately \$3.5 million. These costs will be updated to reflect final designs, after which the repayment terms and conditions will be negotiated between Reclamation and the contracting entities.

Should a large hydrologic event occur after the SOD modifications are complete, the dikes are expected to perform as designed and the flood would pass through the gated spillway and uncontrolled spillway. Consequently, the economic impacts associated with the No Action Alternative would not occur.

C. Land Resources

Federal lands associated with the W.C. Austin Project area are primarily used for recreational purposes. Agricultural activities that occur on lands adjacent to the Project boundary are cultivated. The principal crops are cotton, small grains, and sunflowers. The remaining land is used for pasture and hay production. There are no forested areas. Some trees grow along the watercourses and in cultivated areas used as shelterbelts.

Reclamation is responsible for management of the lands within the W.C. Austin Project boundary. Reclamation has entered into an agreement authoring ODHE, through the Quartz Mountain Nature Park, to administer lands for recreational purposes.

The Lugert-Altus Reservoir lies within the Osage Plains section of the Central Lowlands physiographic province. The foundation for Altus Dam and the reservoir consists of Cambrian granite; Permian beds of clay and shale; and Quaternary alluvium.

The Altus Dam is founded on the competent rock of the Quanah Granite. This granite has been described as binary granite composed principally of quartz and feldspar, with minor percentages of minerals such as mica, magnetite, hornblende, and apatite. This granite is predominately moderately fractured, but does show locally intensely fractured patterns. Bedrock was deformed during the Wichita Uplift, and later intruded by a brittle volcanic Diabase dike, which is less resistant to weathering and erosion. The granite is strong, with an average unconfined compressive strength of approximately 22,820lb/in².

Interfingering clay and shale layers known as the “Red Beds” surround the lake and can be found in the foundations of all dikes, except Auxiliary Dike. The Permian age “Red Beds” of the Hennesey Shale, were formed from the erosional processes fueled by a rising inland sea that eroded the regional rocks with deposition in moderately deep quiet waters.

Borrow material investigations have taken place adjacent to the dikes to determine the quality and quantity of material that could be used for raising the dikes. The borrow areas are identified in Figure 6.

Environmental Consequences

No Action Alternative. There could be an elevated risk to land resources under the No Action alternative. If Lugert Dike and East Dike B fails or overtopping of dikes occurs, there could result in the loss of topsoil that would diminish agricultural activities through hydraulic scouring.

CAS Preferred Alternative. The preferred alternative would not change the primary land uses in the area. Land would continue to be used for recreation, wildlife, and agriculture. The contractor would be allowed to use designated areas of Reclamation operational lands for staging and stockpile/spoil areas.

There are several potential sources of borrow material found within the project boundary. These borrow sources are potential sources of riprap, road surfacing, and miscellaneous fill. Surface investigations and test pits were conducted at each potential site to investigate the material properties, collect samples, and characterize the site conditions, geology, and quantities available for construction. The borrow areas south

of South Dike were previously used for borrow material during the original dam and dike construction. Most of the borrow material needed for the corrective action would be obtained from the borrow areas adjacent to Lugert Dike. Approximately 172,000 cubic yards of material is needed to backfill the trenches at Lugert Dike and East Dike B and raise all of the dikes to crest elevation of 1573.0ft . Of that estimated 172,000 cubic yards, 120,000 cubic yards will be soil material and the remaining 52,000 cubic yards will consist of rock material. Table 5 shows the estimated quantities of material needed to raise the dikes and install the trenches at Lugert Dike and East Dike B.

To preserve as much of the natural environment as possible, the contractor is only allowed to remove material from three of the eight identified soil borrow areas. If the contractor is unsuccessful in obtaining the necessary amount of material, a justification must be submitted to Reclamation stating why an additional borrow area is needed.

Locations of potential borrow areas are shown on Figure 6.

Table 5. Estimated Quantities of Material Needed to Raise the Dikes and Install Trench (Reclamation, 2015)

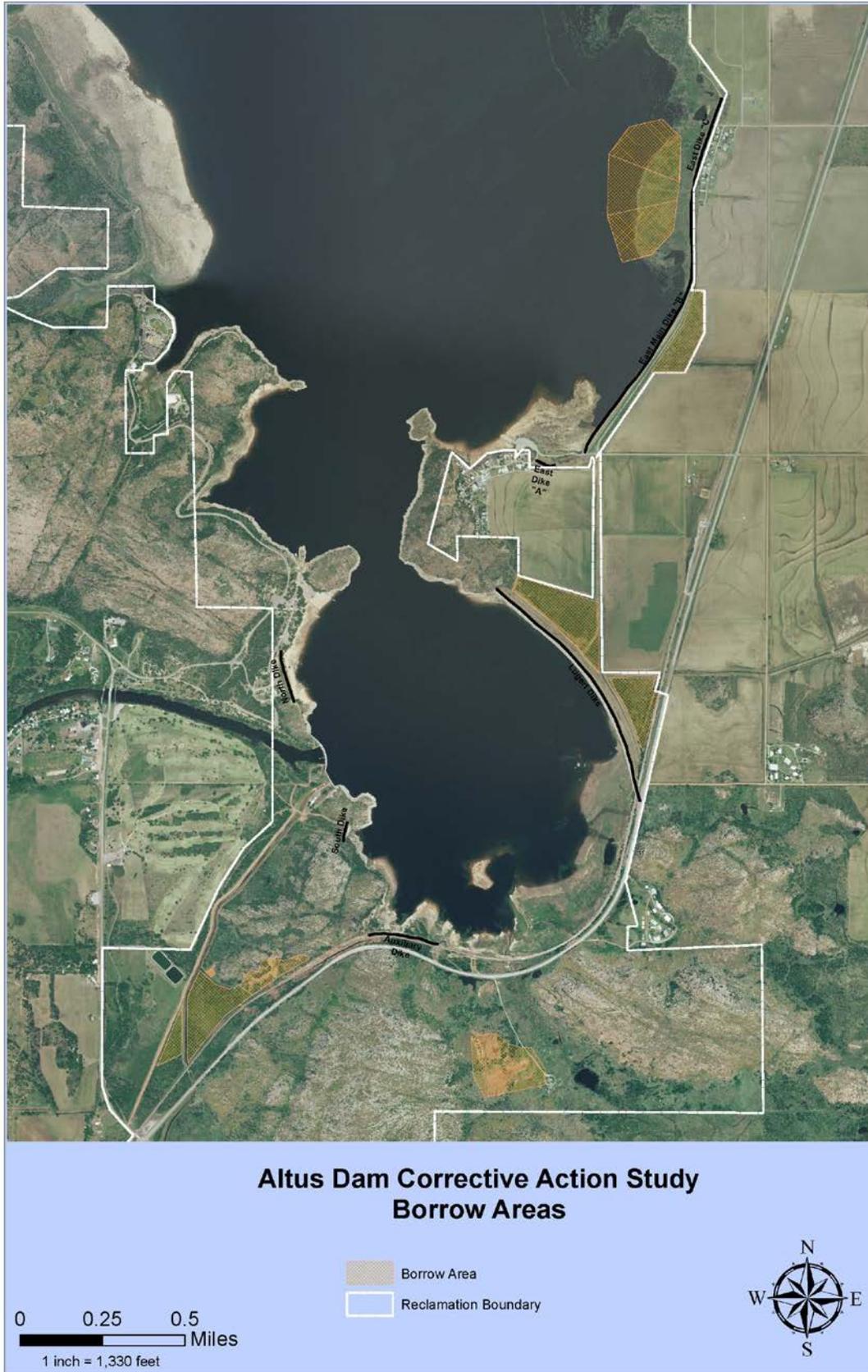
	Total East Dikes	Total Lugert & Auxiliary Dikes	Total North & South Dikes
Dike Raise to 1573			
*Excavation of Material (includes 10% compaction) (yd ³)	12,916	8,330	1,070
**Placement of Material (yd ³)	59,960	30,490	3,123

*Includes riprap, bedding, downstream slope protection and embankment material. **Includes embankment material, riprap, slope protection, gravel surfacing and geotextile.

Trench Only Filter	East Dike B	Lugert Dike	Total
Excavation of Foundation Material (yd ³)	8,300	19,000	27,300
*Placement of Material (yd ³)	28,500	49,500	78,000

*Includes embankment material, riprap, rockfill slope protection, and gravel surfacing.

Figure 6. Location of Potential Borrow Areas



Disturbed areas would be contoured to blend in with the surrounding landscape and reseeded with a native grass mixture. Trees removed during construction would be replaced in accordance with a Reclamation-approved site restoration plan. Silt fences would be installed along the boundary of the area to prevent run-off onto private property (Attachment A).

D. Recreation

Quartz Mountain Nature Park (Park) offers many activities year round. The park is used for boating, fishing, camping, swimming, rock climbing, hiking, bird watching, ATV riding, and horseback riding. Hunting is only allowed within the WMA.

There are seven developed campgrounds located within the park. Located north of the dam are Scissortail, Mountain View, River Run, Redbud and Live Oak Campgrounds. On the east side of Lugert-Altus Reservoir are Cottonwood and Lakeview Campgrounds. An inventory of recreation facilities at these seven campgrounds include 8 cabins, 81 RV sites, 30 tent sites, 1 group camping area, 4 comfort stations, 2 dump stations, 1 fishing dock and 3 boat ramps. A map of Quartz Mountain Nature Park is shown in Figure 7.

The Park reported just over 235,000 visitors in Fiscal Year 2014 and received fees of approximately \$186,429.53. This revenue was generated from daily use and campground fees, Quartz Mountain Grocery, and Quartz Mountain Putt and Paddle.

Figure 7. Quartz Mountain Nature Park



Environmental Consequences

No Action Alternative. Under this alternative, if a flood event occurs and dikes are overtopped and eroded, some campgrounds and other recreational activities could be impacted due to flooding and hydrologic scouring. This could also have an impact on visitation numbers, which could fluctuate if recreational resources are minimized.

CAS Preferred Alternative. The North Dike extension is the only construction activity with the potential to directly impact recreation. During construction activities associated with North Dike, the Scissortail campground would be closed temporarily while construction activities are occurring. To reduce the recreational impacts, construction activities at the North Dike are to take place outside of the peak visitor season, between October and March, and be completed within 60 days. The North Dike would be extended into an adjacent parking lot and across the street to meet required elevation. The North Dike extension would also affect the Cabin number 8 accessible parking space. Upon completion of construction, universal accessibility would be restored to all impacted Cabin 8 facilities. In order to mitigate for the recreational impact at the Scissortail Campground, the entire parking lot adjacent to the North Dike will be replaced to improve future visitor experience. See Figure 8 showing location of the North Dike extension. The Contractor would implement dust and noise abatement procedures.

Figure 8. North Dike



Construction vehicles would utilize the access roads in the Scissortail Campground to transport material to and from the North Dike. The Contractor is responsible for restoring all roads damaged during construction to pre-construction condition.

Temporarily closing the Scissortail Campground would prevent visitors from being exposed to dust, noise, and heavy equipment traffic from construction vehicles. The road in the campground area would be opened to allow visitors to access the Quart Mountain Lodge. Indirect impacts also would result from an increase in construction traffic, but impacts would be temporary.

E. Fish and Wildlife

Several species of birds, mammals, and fish inhabit the Lugert-Altus Reservoir area. Lugert-Altus Reservoir offers a diversity of nesting and feeding grounds for a variety of bird and wildlife species. Lugert-Altus Reservoir and its surrounding lands support an abundant and diverse fauna year-round.

Big and small game species found at Lugert-Altus Reservoir are white-tailed deer, cottontail rabbit, fox squirrel and mourning dove. Furbearers include coyote, bobcat, beaver, and raccoon. Waterfowl species observed are Canada geese.

Several species of upland game birds inhabit the reservoir lands including mourning dove, Rio Grande wild turkey, and bobwhite quail.

Raptors are common on reservoir lands during all seasons and include red-tailed hawk, American kestrel, and great horned owl. Although many species move south during the winter, some are year-round residents and others use the area only during the winter or on migration stopovers.

Non-game birds include the bluebirds, blue-jays, great blue heron, cardinals, Carolina wren, downy woodpecker, eastern meadowlark, northern flicker, red-bellied woodpecker, red-winged blackbird, roadrunner, and tufted titmouse.

A number of reptiles and amphibians occur on the project area such as, smallmouth salamander, gray treefrog, false map turtle, three-toed box turtle, and prairie rattlesnake.

Majority of the fish species found in the Lugert-Altus Reservoir are provided through stocking by ODWC. Fish species include white crappie, walleye, saugeye, channel and blue catfish, and white bass-striped bass hybrids.

Environmental Consequences

No Action Alternative. Under this alternative, if a flood event occurs and dikes are overtopped and eroded, wildlife habitat would likely be lost either directly or from removal and/or damage of top soil and vegetation.

Fish population and habitat would be impacted and Lugert-Altus Reservoir would not have the capacity to store water or the ability to maintain the current fish population.

CAS Preferred Alternative. Construction and noise associated with raising the dikes would temporarily displace wildlife in the construction areas. Small mammals, birds, and reptiles are the most susceptible to this type of displacement. Larger animals such as deer, turkey, etc. are expected to avoid construction areas. With the exception of the Auxiliary Dike, all construction would take place above the reservoir water surface. Auxiliary Dike construction activities with potential to occur below the conservation pool (1559 msl) will be sequenced to occur when the reservoir level is below the construction area, thus prohibiting fish passage into the construction area.

Displaced wildlife would likely find suitable habitat in surrounding areas where similar vegetation is present. Species such as small mammals and nesting ground birds are expected to return to reclaimed areas after construction. Temporary loss of habitat would occur where vegetation is removed during construction activities. As stated in Attachment A, disturbed areas would be contoured to blend in with the natural grade and reseeded with native grass seed. Trees that are removed would be replaced with similar vegetation.

F. Threatened and Endangered Species

The Endangered Species Act of 1973 gives U.S. Fish and Wildlife Service (USFWS) federal legislative authority for the protection of threatened and endangered species. This protection includes a prohibition of direct take (i.e. killing, harassing) and indirect take (i.e., destruction of critical habitat).

Section 7 of the Endangered Species Act set forth the guidelines for interagency cooperation to conserve federally listed species. This EA made use of Reclamation expertise, species collection/location lists provided by the USFWS, field review by Reclamation, and research literature for the various listed species to ensure Section 7 compliance.

The T&E species list for the W.C. Austin Project has been reviewed for this proposed project. Table 6 lists the T&E species from the 2015 USFWS Endangered Species List accessed June 2015 (Attachment B).

Black-Capped Vireo

The black-capped vireo was federally listed as endangered without critical habitat on November 5, 1987. A 5-year review was completed on July 26, 2007, in which the USFWS recommended down listing the species to threatened. They nest from Oklahoma south through Texas to the Edwards Plateau, then south to the northern portion of Mexico.

Breeding habitat is quite variable across its range, but is generally shrublands with a distinctive patchy structure. The shrub vegetation is mostly deciduous and generally extends from the ground to about 2 meters above ground and covers about 30 to 60 percent of the total area. Open grassland separates the clumps of shrubs. Black-capped vireos may live for more than 5 years, and usually return year after year to the same territory to breed.

As of 2007, about 75 percent of the known population in the breeding range was found on four well-surveyed areas- Fort Hood Military Reservation (Texas), Wichita Mountains Wildlife Refuge (Oklahoma), Kerr Wildlife Management Area (Texas), and Fort Sill Military Reservation (Oklahoma). USFWS indicates that Greer County, Oklahoma has the potential for black-capped vireo habitat; however, a habitat assessment conducted on April 17, 2015, concluded that habitat does not occur within the proposed project area.

Piping Plover

The piping plover was listed as a threatened species in 1985. Historically, piping plovers bred along the Atlantic Coast, in the northern Great Plains, and around the Great Lakes. Piping plovers winter along the southern Atlantic and Gulf coasts, and in the Bahamas and West Indies. Although drastically reduced, remnant populations occur throughout their historic range. Piping plovers migrate through the eastern two-thirds of Oklahoma each spring and fall, utilizing exposed areas of sand-bottom rivers, reservoir beaches, and mudflats.

Piping plovers breed on sand/gravel shorelines around small lakes, beaches, river islands, and sand pits. Suitable breeding habitat consists of wide beaches with highly clumped vegetation, generally less than 5% overall cover. Vegetation cover on nesting islands is generally less than 25%. Nonbreeding habitat consists of sandy beaches and sand/mudflats, usually in areas with high habitat heterogeneity. Piping plovers forage along open shorelines and flats, alternately running and pausing to search for prey. The diet consists of a variety of invertebrates including worms, fly larvae, beetles, crustaceans, and mollusks.

Major threats to piping plovers include destruction and degradation of summer and winter habitat through changes in lake levels, shoreline erosion, human disturbance of nesting and foraging birds, and predation. Human disturbance during the nesting season is the major threat in many areas through inhibiting courtship, incubation, and brooding, and nest trampling. USFWS indicates that Greer and Kiowa County, Oklahoma has the potential for piping plover habitat; however, a habitat assessment conducted on April 17, 2015, concluded that habitat does not occur within the proposed project area.

Red Knot

The red knot was federally listed as threatened on January 12, 2015. The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southwest United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. During both the northbound (spring) and southbound (fall) migrations, red knots use key staging and stopover areas to rest and feed.

Habitats used by red knots in migration and wintering areas are similar in character, generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. In North America, red knots are commonly found along sandy, gravel, or cobble beaches, tidal mudflats, salt marshes, shallow coastal impoundments and lagoons, and peat banks. USFWS indicates that Greer and Kiowa County, Oklahoma has the potential for Red knot habitat; however, a habitat assessment conducted on April 17, 2015, concluded that habitat does not occur within the proposed project area.

Whooping Crane

In the United States, the Whooping Crane was listed as threatened with extinction in 1967 and Endangered in 1970 – both listings were “grandfathered” into the Endangered Species Act of 1973. Critical habitat was designated in 1978 in Oklahoma, Kansas, Nebraska, and Texas. USFWS designated the Whooping Crane as experimental, non-essential on June 26, 2001, within several states including New Mexico and Montana (USFWS, 2001).

The only natural wild population of the species nests in Canada and winters on the Gulf coast of Texas (Lewis, 1995). Attempts to establish a population in the Rocky Mountains were abandoned in the early 1990s. The Canadian population migrates through Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. USFWS indicates that Greer and Kiowa Counties in Oklahoma have the potential to be a temporary migratory area for the whooping crane, but the international recovery plan for the whooping crane does not consider this project area to be a

stopover point nor is it designated as a critical habitat area. No potential habitat within the reservoir area would be impacted by the proposed project.

Least Tern

The least tern was federally listed as an endangered species on May 28, 1985. Historically, least terns used major river systems in the Midwestern United States such as the Red, Rio Grande, Arkansas, Missouri, Ohio, and the Mississippi. In Oklahoma, least terns nest along the large rivers and the Salt Plains Wildlife Refuge. Terns typically arrive in Oklahoma between April to June where they would spend four to five months. The terns would nest in small colonies on exposed flats, sandbars, and beaches. The terns have been known to travel up to four or more miles from the nest to find small fish that make up a bulk of their diet.

Least terns have declined due to habitat loss from permanent flooding by reservoirs and channelization projects, unpredictable water discharge patterns, and overgrowth of brush and trees. The recreational use of sandbars by humans is a major threat to the tern's reproductive success. USFWS indicates that Greer and Kiowa Counties in Oklahoma have the potential for least tern habitat; however, a habitat assessment completed by Reclamation determined there to be no suitable habitat within the proposed areas of disturbance.

Environmental Consequences

No Action Alternative. Under this alternative, no impacts to the above listed threatened and endangered species would occur due to suitable habitat not occurring within the project area.

CAS Preferred Alternative

Black-Capped Vireos

Although potential black-capped vireos habitat may exist within the Lugert-Altus Reservoir area, no habitat would be impacted by the modifications of the dikes. The closest known black-capped vireos are located at the Wichita Mountains Wildlife Refuge about 65 miles away. A habitat assessment completed by Reclamation on April 17, 2015, determined there to be no suitable habitat present in or around areas that could be disturbed during construction. There would be no direct, indirect, or cumulative impacts to this species associated with the proposed project.

Piping Plover

Although potential piping plover habitat may exist within the Lugert-Altus Reservoir area, no habitat would be impacted by the modifications of the dikes. Piping plover

migrates through the eastern two-thirds of Oklahoma during the spring and fall and are not likely to be in the area during construction. A habitat assessment completed by Reclamation on April 17, 2015, determined there to be no suitable habitat present in or around areas that could be disturbed during construction. There would be no direct, indirect, or cumulative impacts to this species associated with the proposed project.

Red Knot

Although potential red knot habitat may exist within the Lugert-Altus Reservoir area, no habitat would be impacted by the modifications of the dikes. A habitat assessment completed by Reclamation on April 17, 2015, determined there to be no suitable habitat present in or around areas that could be disturbed during construction. There would be no direct, indirect, or cumulative impacts to this species associated with the proposed project.

Whooping Crane

Modifications to the dikes at Lugert-Altus Reservoir would not affect the whooping crane because there is no suitable habitat present in or around areas that could be disturbed during construction. There would be no direct, indirect, or cumulative impacts to this species associated with the proposed project.

Least Tern

Although potential least tern habitat may exist within the Lugert-Altus Reservoir area, no habitat would be impacted by the modifications of the dikes. A habitat assessment completed by Reclamation on April 17, 2015, determined there to be no suitable habitat present in or around areas that could be disturbed during construction. There would be no direct, indirect, or cumulative impacts to this species associated with the proposed project.

Table 6. Federally Threatened and Endangered species - Effects Determination

Birds	Status	Has Critical Habitat	Effects Determination
Black-Capped Vireo (<i>Vireo atricapilla</i>)	Endangered	No	No Effect
Piping Plover (<i>Charadrius melodus</i>)	Threatened	No	No Effect
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	No	No Effect
Whooping crane (<i>Grus americana</i>)	Endangered	No	No Effect
Least tern (<i>Sterna antillarum</i>)	Endangered	No	No Effect

G. Migratory Birds

The Migratory Bird Treaty Act of 1918 in conjunction with Executive Order (EO) 13186: “Responsibilities of Federal Agencies to Protect Migratory Birds: requires agencies to ensure that NEPA analysis includes an evaluation of potential effects on migratory birds.

Many bird species migrate through the Central Flyway, and through central Oklahoma. Some nest in the area, using trees or other habitat, from March 1- August 31.

Environmental Consequences

No Action Alternative. Under this alternative, if a flood event occurs during the migratory bird-nesting season, habitat would likely be lost due to removal and/or damage of vegetation.

CAS Preferred Alternative. Potential and existing habitat for migratory birds would be temporarily lost to certain construction activities that remove mesquite, cottonwoods, and American elm. These trees and shrubs would be removed from the borrow areas. These areas, along with all other disturbed areas, would be replanted with native grass seeds post-construction.

Migratory birds would be temporarily disturbed and would likely be displaced from parts of the project area during the construction activities. Increased vehicle traffic in the area may increase the noise level and the risk of mortality and injury from vehicle collisions. Species that were displaced would likely find suitable habitat in surrounding areas where similar vegetation is present. Once construction activities are complete, disturbed areas would be contoured to blend in with the natural grade and reseeded with native grass seed. Trees that are removed would be replaced with similar vegetation.

If construction were to occur within the migratory bird-breeding season (March 1 – August 31) and potential migratory bird habitat exists, presence/absence surveys would be required and if nests are encountered, they would be avoided.

H. Vegetation and Waters of the U.S.

The project area is located in Greer and Kiowa County, north of the City of Altus in southwestern Oklahoma in EPA Ecoregion 27, as shown in Figure 9 (EPA, 2005). The Central Great Plains Ecoregion is mostly comprised of tall grass prairie, mesquite grasslands, sand-sage grassland, and mixedgrass eroded plains. The areas of disturbance include the borrow areas, contractor’s staging area and space for a Reclamation’s potential construction oversight office. Native forbs and grasses

common to the prairie area are curly cup gumweed, prairie bundle flower, Indian wood-oats, Illinois bundle flower, white sagebrush, tall fescue, and silverleaf nightshade. Previously disturbed areas are resident to noxious species such as Johnson grass, lespedeza, salt cedar, and Eastern Red Cedar.

Throughout the project area, the tree stratum is composed of eastern red cedar, mesquite, hackberry, cottonwood, American elm, and black willow. Shrub species that contribute to the area are comprised of yucca glauca, and sumac.

The project area has been surveyed for wetland occurrence. Reclamation staff used the National Wetland Inventory (NWI) mapper provided by the USFWS to identify any wetlands within the project area. With the exception of the modification of the upstream face of the Auxiliary Dike and the borrow area located below East Dike C, which will require adherence to Section 404 of the Clean Water act, NWI identified two potential wetlands located below Lugert Dike within the borrow areas. The approximate size of the wetlands was 0.27 acres and 4 acres. Reclamation staff conducted a site visit to further evaluate and make wetland determinations. Reclamation used the Wetland Determination Data Form to confirm the findings identified on the NWI. After completing the form, and analyzing the vegetation, hydrology, and soils, Reclamation determined that these areas do not have the characteristics or indicators to be identified as a jurisdictional wetland under Section 404 of the Clean Water Act. Reclamation will obtain a Section 404 permit for the fill associated with the modification of the Auxiliary Dike and for the removal of material from the borrow area upstream of East Dike C.

The Altus-Lugert Wildlife Management Area (WMA), which is located within the W.C. Altus project boundary, north of Altus Dam, consists of approximately 3,600 acres of land within the flood pool of Lugert-Altus Reservoir licensed to the Oklahoma Department of Wildlife Conservation (ODWC). The North Fork of the Red River flows through the WMA. Numerous side channels and oxbows provide habitat for diversity of fish and wildlife species. Cottonwoods, American elm, black willow, Kentucky coffeetree, honey locust, eastern red cedar, and the exotic salt cedar are the dominant trees and shrubs found in the WMA. The vegetation of side channels, oxbows and other wetlands is dominated by cattails and other aquatic and semi-aquatic plants. Mixed and tallgrass prairie sites can be found on uplands, along with stands of sand plum.

Ecoregions of Oklahoma

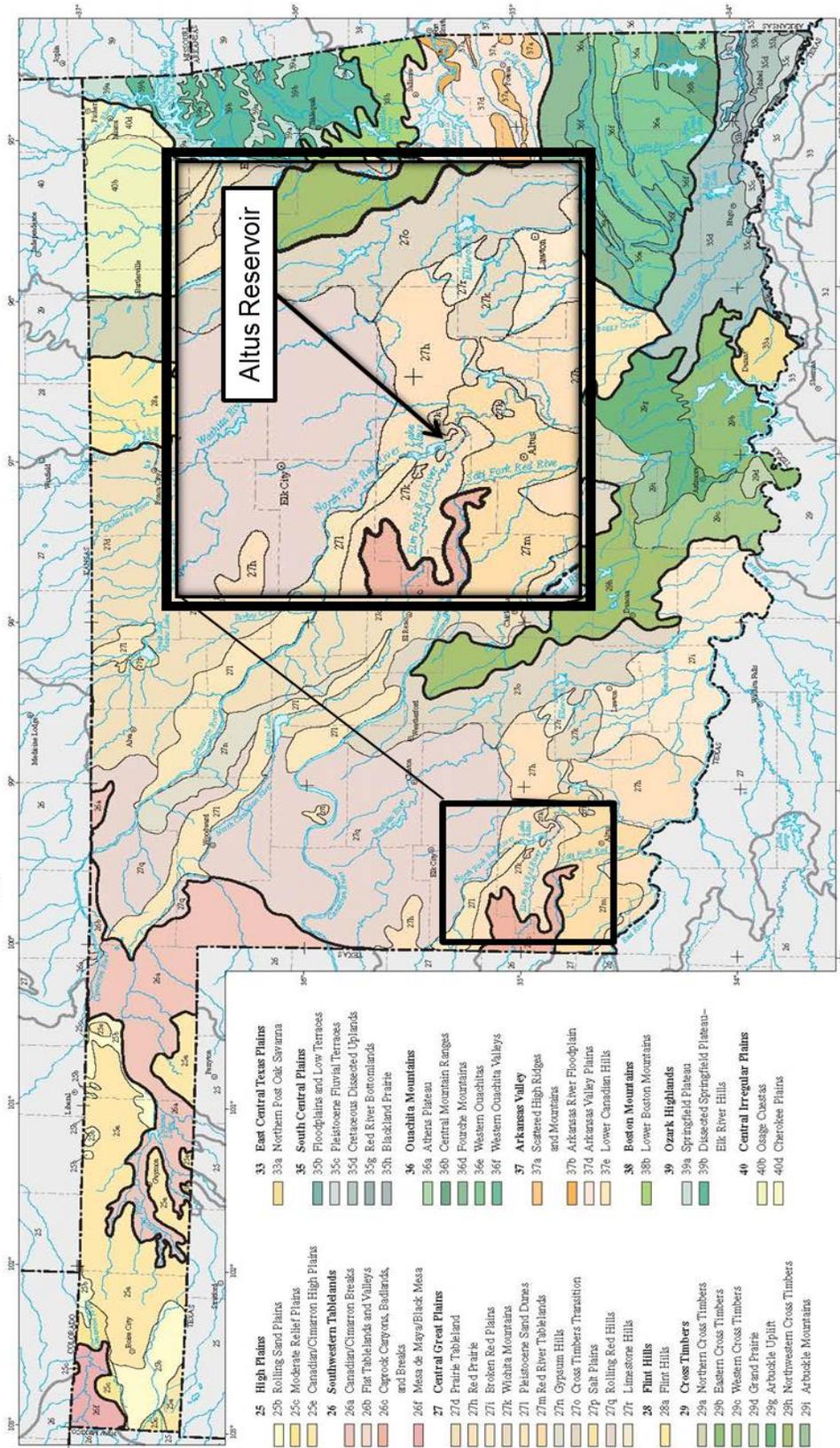


Figure 9. EPA Ecosystem 27

Environmental Consequences

No Action Alternative. Under this alternative, if a flood event occurs and dikes fail, native grass communities and shrubs would be damaged and/or destroyed due to extreme flooding. Extreme flooding could also cause erosion and alter the existing soil and topography.

CAS Preferred Alternative. Construction of the SOD modifications would affect vegetative communities within the borrow areas. Up to approximately 108 acres of vegetated land has been identified as potential sources for borrow material, and approximately 0.3 acres has been identified as a contractor's staging area and for stockpiling material.

Where material is obtained within the borrow areas, tree and shrub removal may be required. Disturbances such as leveling surfaces for stockpiling construction materials would likely occur. After construction, disturbed areas would be contoured to blend in with the surrounding area and re-vegetated with native plant species consistent with more desirable vegetation types. The Contractor shall develop a restoration plan for Reclamation's review and approval. The Contractor shall be responsible for controlling any invasive plant species that may occur during construction.

I. Climate Change and Greenhouse Gases

Reclamation is required to consider potential climate change impacts when developing NEPA and other decisional documents. The Council on Environmental Quality (CEQ) has also issued draft guidance on climate change that requires federal agencies to determine whether and to what extent (1) their actions may affect climate change, and (2) how climate change may affect their actions.

The project area is in a region that has a semi-arid temperature-moisture regime. Prevailing winds from the south to southwest are dominant, averaging twelve miles-per-hour. Average annual precipitation ranges from about 24 – 30 inches. May and October are the wettest months, on average, but much of the spring through fall receives sufficient rainfall. Thunderstorms occur on about 45 days each year, predominantly in the spring and summer. Temperatures range from an average daytime high of 95 degrees in July to an average low of 25 degrees in January (5).

To address climate change in long-term planning, Reclamation and other federal agencies developed a literature synthesis on climate change. Reclamation's Technical Service Center Water Resources Planning and Operations Support Group reviewed and developed a region-specific literature synthesis to address regional climate predictions. Lugert-Altus Reservoir in Oklahoma is in Reclamation's Great Plains (GP) Region. According to the literature synthesis, it appears that all areas of the GP Region became

warmer since the beginning of the 20th century, and some areas received more winter precipitation during the 20th century. In southern GP Region, the location of the project area, temperatures have increased by approximately 0.63°F between 1901 and 2008. Annual precipitation increased by more than 10% in the southern GP over the same time period. Looking forward, Reclamation completed a climate change analysis for the Oklahoma-Texas region which projected warmer temperatures through the 21st century; precipitation appear more stable (Reclamation 2010).

Environmental Consequences

No Action Alternative. No change in greenhouse gas emission trends are anticipated under the No Action Alternative.

CAS Preferred Alternative. Greenhouse gas emissions associated with construction equipment would be minimal and temporary relative to the magnitude and duration of emissions that occur in the region; therefore, any emission-related impacts on climate change would be insignificant and discountable. Regarding the impacts of climate change on the preferred alternative, while there is a considerable amount of research exploring the potential future changes in climate and hydrology across the western U.S., research does not present methods to directly apply the results of these analyses into a dam safety framework (Reclamation, 2015). Reclamation recently attempted to demonstrate how climate change information may be utilized directly within a hydrologic hazard analysis informing Reclamation dam safety investigations. A case study pilot investigation was completed on Friant Dam, California (Reclamation, 2015). The study identified a potential methodology for evaluating climate change on hydrologic loadings for a Reclamation dam, but showed that given the extreme variability associated with climate projections, uncertainty/risk estimates would provide more information about the potential probabilities and associated impacts of future climate conditions relative to baseline hydrologic data currently used. Without such an established methodology, the current risk calculation methodologies employed by Reclamation that were used in this study appear to be the best approach for assessing which hydrologic regime may be reasonably foreseeable to support recommended corrective action measures.

J. Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994, requires agencies to identify and address disproportionately adverse human health or environmental effects of their actions on minorities and low income populations and communities, as well as the equity of the distribution of the benefits and risks of their decisions, and allow all portions of the population a meaningful opportunity to participate in the development of, compliance with, and enforcement of Federal laws, regulations and policies, affecting

human health or the environment regardless of race, color, national origin or income. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. To comply with the environmental justice policy, agencies are to identify and evaluate any anticipated effects, direct or indirect, from the proposed project, action, or decision on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks. If a minority or low-income population is identified, appropriate outreach actions would be initiated to ensure dissemination of information and participation.

Altus Dam, dikes, and reservoir is located in Greer and Kiowa Counties. Table 7 provides the numbers and percentages of population for seven racial categories (White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other race, and Two or More Races) and the Hispanic or Latino population, a minority ethnic group, for each county, and the State of Oklahoma (U.S. Census Bureau, 2010).

Table 7. Race and Ethnicity

	Greer County		Kiowa County		Oklahoma	
	Number	Percent	Number	Percent	Number	Percent
Total population	6,239	100.0	4166	100.0	3,450,654	100.0
One race	6,018	96.5	3,944	94.7	3,294,669	95.5
White	5,181	83.0	3,190	76.6	2,628,434	76.2
Black or African American	441	7.1	275	6.6	260,968	7.6
American Indian and Alaska Native	167	2.7	214	5.1	273,230	7.9
Asian	11	0.2	27	0.6	46,767	1.4
Native Hawaiian & Other Pacific Islander	6	0.1	2	0.0	2,372	0.1
Some other race	212	3.4	236	5.7	82,898	2.4
Two or more races	221	3.5	222	5.3	155,985	4.5
Hispanic or Latino (of any race)	609	9.8	492	11.8	179,304	5.2

Low-income populations are identified by several socioeconomic characteristics. Table 8 provides income, poverty, unemployment, and housing information for each county and the State of Oklahoma (U.S. Census Bureau 2010).

Table 8. Income and Housing Information

	Greer County	Kiowa County	State of Oklahoma
Income			
Median family income	\$48,694	\$46,015	\$56,464
Per capita income	\$17,969	\$23,576	\$24,208
Percent below poverty level			
Families	5.9	17.3	12.6
Individuals	9.9	22.6	16.9
Percent unemployed	1.2	2.9	4.3
Percent of housing			
1.01 or more occupants per room	2.8	1.2	2.0

Median family income for each of the two counties is less than the State-wide average. According to the 2010 census, Greer and Kiowa Counties are comprised of a combined population of 10,405, with 23.2% below the poverty level.

Environmental Consequences

Impacts to All Alternatives. No adverse natural resource or socioeconomic impacts adversely affecting minority and low-income populations have been identified. Therefore, there are no environmental justice impacts.

K. Cultural Resources

The geographic area or areas within which a Federal undertaking may directly or indirectly cause changes in character or use of historic properties is called the Area of Potential Effect (APE). The APE for the dikes and borrow pits alternative are located on lands owned by Reclamation. Specific areas include the construction zones, lands adjacent to the construction zones, any new borrow areas or borrow areas which are expanded beyond their presently surveyed areas as a result of this project, and any lands below normal reservoir surface elevation exposed for the borrowing of material.

A literature and file search of the records of the Oklahoma Archaeological Survey indicates that there are recorded prehistoric and historic archaeological sites within the W.C. Austin Project area. No archeological sites are located within the borrow areas or dikes.

The Altus Dam was constructed between 1941 and 1948. The dam is individually eligible for the National Register of Historic Places (NRHP). The dam is the key feature of the W.C. Austin Irrigation Project. The Altus Dam has a high degree of integrity, even though there has been repair of some features, replacement of others, and there has

been ongoing maintenance over the years. None of these changes has significantly altered the appearance of the structure.

The five earthen dikes (North Dike, East Dike, Lugert Dike, South Dike, and Auxiliary Dike) all contribute to the historical significance of the District. Another contributing feature is the small bridge directly below Altus Dam on the wasteway. The four main canals (Main, West, Ozark, and Altus) also contribute to the District. Lugert-Altus Reservoir contributes to the Project's eligibility in the context of the lake's normal operation.

The W.C. Austin Project was determined eligible for the NRHP in 2002 by Reclamation, and the Oklahoma State Historic Preservation Office (SHPO) concurred with this determination. Any actions that will significantly alter the historic appearance and function of the dam or contributing features of the District require SHPO consultation.

It is Reclamation's goal to avoid disturbing or altering the character of all NRHP eligible or contributing elements during planning, construction, and operation and maintenance steps of proposed undertakings. Archeological surveys have been conducted at the proposed borrow areas. Historic foundations were found within the borrow area downstream of Lugert Dike and upstream of East Dike C. Reclamation has initiated consultation with SHPO and OAS and is awaiting their concurrence that these historic foundations are not significant. Construction activities will not begin without concurrence from SHPO and OAS.

If procurement of materials from non-Reclamation lands results in the creation of new borrow areas, or the expansion of existing borrow areas beyond their present limits, these borrow areas would be subjected to a cultural resource survey.

Environmental Consequences

No Action Alternative. Under this alternative, if a flood event occurs, the dikes would be damaged and/or destroyed creating an adverse effect to contributing features that eligible for the National Register of Historic Places.

CAS Preferred Alternative. Under the preferred alternative, raising the dikes two feet would not result in a significant change to the characteristics, aesthetics nor jeopardize its integrity. The increase in height would be accomplished using the in kind material as in the original construction, and once construction is complete, the change in height and width would be unnoticeable and resemble their original look when constructed in the 1940s.

Cultural resource surveys were conducted at five borrow area locations. There are no

buildings or structures within the area of potential affect that are 45 years old or older. Historic foundations were found in the borrow areas, but Reclamation has determined that they are not significant and are not eligible for listing in the NRHP.

Reclamation determined that no historic properties would be affected by the proposed action of raising the dikes two feet. On August 28, 2015 the Oklahoma SHPO concurred with Reclamation's determination that no historic properties will be affected with the excavation of test pits in the proposed borrow areas and on the dikes (Appendix B). If cultural resources or human remains are encountered during project implementation, work in the immediate area would cease and OTA's archeologist would be immediately notified. Reclamation would consult, as appropriate, under Section 106 of the National Historic Preservation Act on inadvertent cultural resources discoveries. If human remains are discovered on federal land, or a cultural resource is determined to be a Native American cultural item, those remains and/or items would be treated according to the provisions set forth by the Native American Graves Protection and Repatriation Act (NAGPRA). The project would not resume until Reclamation meets all compliance requirements and provides a written notice to proceed.

L. Indian Trust Assets

The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Native American tribes or Native American individuals by treaties, statues, and executive orders. This trust responsibility requires that all Federal agencies take all actions reasonably necessary to protect trust assets. Reclamation's policy is to protect Indian trust assets from adverse impacts of Reclamation programs and activities. Indian trust assets (ITA) are legal interests in property held in trust by the United States for Indian tribes or individuals. ITAs include, but not limited to, lands, minerals, hunting and fishing rights, and water rights.

Environmental Consequences

Impacts to All Alternatives. There are no Indian Trust Assets in the proposed areas of borrow or construction. The proposed corrective action would not affect tribal water rights or other ITAs.

M. Air Quality and Noise

EPA has designated all areas in the region as meeting attainment, yet the project area does not contain an active air quality monitoring program. The nearest air quality monitoring program, located in Comanche County, provides historic air quality data reflecting "good" with a few minor various to "moderate" conditions. This rating indicates that atmospheric conditions in the area would likely limit dispersion of any potential contaminants.

The U.S. Environmental Protection Agency defines noise as "unwanted or disturbing sound". Currently the primary noise sources within the project area include boating activity, traffic, and operational military aircraft located at Altus Air Force Base. Figure 10 is included to provide context as to typical range of outdoor sound levels.

No Action Alternative.

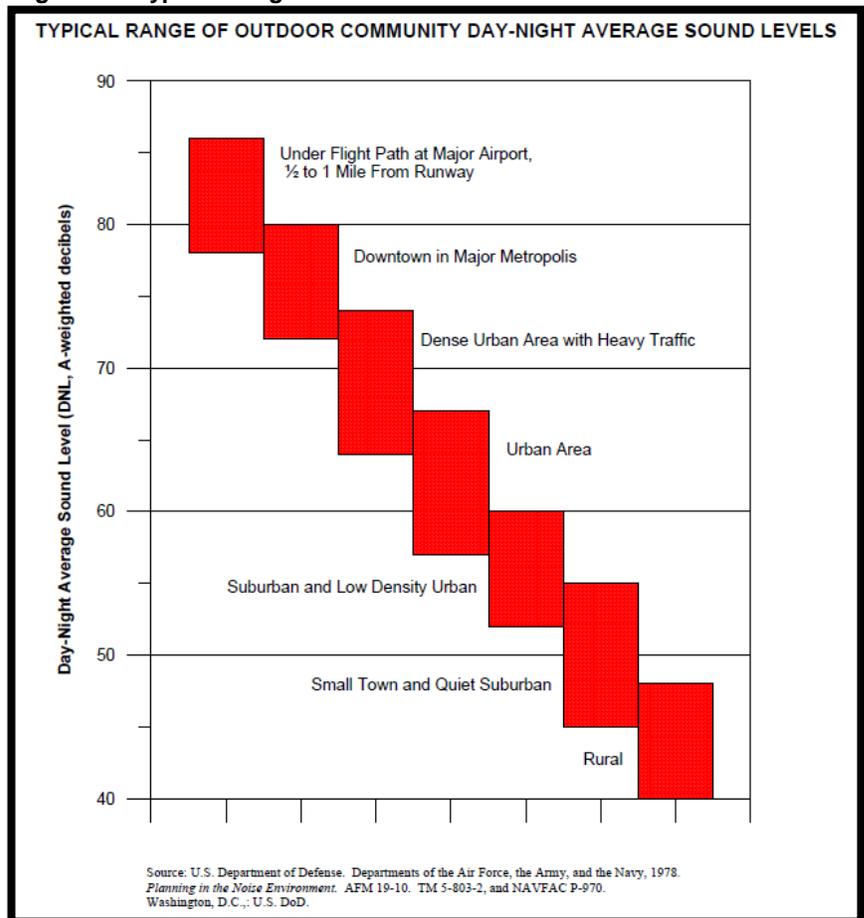
Under this alternative, no changes in air quality or noise would be anticipated.

CAS Preferred Alternative.

Impacts from construction activities are not expected to affect EPA quality rating and would be localized and temporary. With the low atmospheric dispersal potential and the intermittent and temporary nature of the proposed construction activities, minimal air quality impacts are expected. In order to minimize any dust, the contractor will employ dust abatement procedures (such as watering).

Noise associated with construction activities is expected to have the greatest impact, during a 115 day period, when construction is located in the area adjacent to the East Dike C and North Dike. In order to adequately assess the noise impacts Reclamation utilized the Federal Highway Administration's Roadway Construction Noise Model (RCNM). In the area adjacent to East Dike C, equipment will potentially be operating within 100 feet of some residences, yet are not expected to exceed 77dB. If material is

Figure 10: Typical Range of Outdoor Sounds



removed from the borrow area upstream of East Dike C, the contractor will utilize noise abatement procedures by avoiding construction activities within 400 feet of the residences limiting the maximum minimizing the noise pollution levels to residence, below 67 dB.

At North Dike, construction activities will occur outside of the peak visitor season (October – May) and must be completed within 60 days. The Scissortail Campground will be closed during this time. Visitors in the surrounding area will likely experience some construction noise and encounter heavy trucks and construction vehicles.

Noise impacts are localized, temporary, and limited in context and intensity. Timing of noise-generating sources will be restricted to normal construction hours of 7am to 7pm, Monday – Friday, thus limiting exposure. Upon completion of the removing material from the borrow area and raising East Dike C, noise levels would be expected to return to preconstruction conditions.

2. Consultation and Coordination

Staff from Reclamation’s Technical Service Center in Denver and the Great Plains Region coordinated and designed the proposed alternative based on current conditions, field investigations, and state-of-the art Safety of Dams design and engineering. Staff from these offices worked closely using project management teams throughout the risk reduction and alternative development process.

Reclamation consulted with the LAID and the City of Altus, the project beneficiaries, regarding project developments and invited them to participate, as they desired in the various studies, reviews, and project meetings.

Specific consultation and coordination activities are documented in the following list.

<u>Date</u>	<u>Action</u>
2001-2006	Reclamation performed and completed various analysis and investigations of embankment and foundation seepage conditions at Altus Dikes throughout this period. Communication with the District was extensive and frequent throughout this period.
9/26/2006	Reclamation met with the District to provide a status of ongoing dam safety related activities, analyses and findings identified in the 2006 Comprehensive Facility Review (which includes the results of the 2001 to 2006 investigations and analysis identified above) that corrective actions may be necessary to address risks associated with seepage issues at

Lugert and East Main Dikes and flood issues for all structures.

- 10/18/2006 Reclamation provides letter to all project beneficiaries informing them of the actions required to address Dam Safety Issues at Altus Dam and Dikes, Reclamation's responsibilities and commitment to involve and seek input from them for all aspects of the project, and Dam Safety Act and Reclamation policies regarding requirements for repayment of costs.
- 9/11/2009 Reclamation holds an internal scoping meeting conducted at Oklahoma City Field Office to discuss static and hydrologic risk reduction options for Altus Dam.
- 10/29/2009 Reclamation holds working meeting with all project beneficiaries to discuss the Corrective Action Study (CAS) process, to identify and discuss screening level alternatives to reduce the risks at Altus Dam and Dikes, to receive input concerning the implementation of alternatives, to discuss repayment costs associated with the CAS, and to discuss the desired level of involvement of the project beneficiaries in this process.
- 9/3/2010 Reclamation provides letters to all project beneficiaries with a status update of the actions performed and budget expenditures in FY 2010 to address the Dam Safety Issues.
- 11/7/2011 Reclamation provides letters to all project beneficiaries with a status update of the actions performed and budget expenditures in FY 2011 to address the Dam Safety Issues.
- 9/17/2012 Great Plains Regional Director Memorandum establishing the PMT. Monthly PMT meetings are scheduled and project beneficiaries are invited to attend.
- 11/30/2012 Reclamation provides letters to all project beneficiaries with a status update of the actions performed and budget expenditures in FY 2012 to address the Dam Safety Issues.
- 8/9/2013 Transmittal of July 2013 Constructability Review Report – Altus Dam and Dikes Modification Project, W.C. Austin Project, Great Plains Region, Oklahoma.
- 10/6/2014 Reclamation met with the independent consultant from the URS Corporation to discuss the draft finding from the Consultant Review Board.
- 2/2/2015 A five-day value engineering study of the preferred Corrective Action Alternatives was performed to improve value and achieve higher return on investment.
- 3/16/2015 Reclamation design team performs a site visit to Altus Dikes and meets

with LAID operations staff.

Agencies Consultation

National Historic Preservation Act

In pursuit of its requirements under the National Historical Preservation Act, Reclamation submitted a consultation letter and archeological report June 18, 2015 to the Oklahoma Archeological Survey (OAS) and Oklahoma Historical Society on the potential impacts of the CAS preferred alternative to cultural and historical properties. In a letter June 19, 2015, the OAS concurred with Reclamation's determination that cultural resources would not be adversely affected by the preferred alternative. In a letter August 28, 2015, the OHS concurred with Reclamation's determination that no historic properties would be affected by the CAS preferred Alternative. (Attachment B). Additional historic foundations were discovered within the borrow area downstream of Lugert Dike and upstream of East Dike C. Reclamation initiated consultation with SHPO and OAS on February 12, 2016 and is awaiting their concurrence that these historic foundations are not significant. Construction activities will not begin without concurrence from SHPO and OAS.

Endangered Species Act (1973) Section 7 Consultation

The USFWS Tulsa Office provided an Official Species List on May 18, 2015. This species list fulfills the requirements of the USFWS under section 7(c) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Reclamation has concluded that the proposed action would have a No Effect determination on federally listed species; therefore, no further consultation with USFWS was initiated.

Clean Water Act

Section 404 of the Clean Water Act (CWA) requires that a permit be obtained from the USACE when discharge of dredge or fill material into wetlands and waters of the United States occurs. There are two areas potentially subject to Section 404 requirements within the project area.

1. Upstream face of Auxiliary Dike. Potential fill area.
2. Borrow area located on the upstream side East Dike C, which is located within the conservation pool (1559 msl).

Reclamation would obtain a Section 404 permit from USACE for construction activities at Auxiliary Dike and at the borrow area located upstream of East Dike C.

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Attachment A

Environmental Commitments

- Based on the need to apply for a permit under Section 404 permit, Reclamation would provide the Environmental Assessment and other information to the USACE, Tulsa District to assist in their preparation of a NEPA analysis addressing the permit application for construction activities.
 - Reclamation will obtain the Section 404 permit associated with the Auxiliary Dike and the borrow area upstream of East Dike C.
- Reclamation's contractor would obtain State and Federal permits for the proposed project activities including Clean Water Act Section 401, 402, and 404 permits, and a Storm Water Discharge Permit from the Oklahoma Department of Environmental Quality and submit a Stormwater Pollution Prevention Plan prior to construction activities.
- In order to mitigate for the recreational impact at the Scissortail Campground, the entire parking lot adjacent to the North Dike will be replaced to improve future visitor experience.
- Reclamation's contractor would develop a restoration plan, addressing all disturbed areas, for review and approval. The restoration plan must include, but not limited to:
 - Borrow Area Use and Restoration Plan
 - Seeding, Sod and Soil Supplement Plan
- To preserve as much of the natural environment as possible, the contractor is only allowed to remove material from three of the eight identified soil borrow areas. If the contractor is unsuccessful in obtaining the necessary amount of material needed to complete the project, they must provide justification to Reclamation stating why an additional borrow area is needed.
- Reclamation's contractor is required to employ dust abatement procedures (such as watering).
- Reclamation's contractor would be responsible for complying with all environmental requirements identified in this Environmental Assessment and with all federal, state and local permits. Best Management Practices would be implemented to limit impacts to water quality. The contractor would be required to reclaim all disturbed areas including all staging and stockpile areas, borrow areas, and access roads. The following BMPs would be used to reclaim the disturbed areas.

The list included in this attachment is not limiting but reference the most frequently used methods.

Soil Disturbance

1. Surface runoff will be adequately controlled using mitigations such as water bars, fiber mats, contour felling, silt screens, and vegetative filters.
2. All surface disturbances are required to be reseeded/re-vegetated with native grass and plant species common to the site's natural plant community.
3. A temporary protection surface treatment such as mulch, matting and netting is required for reclaiming all mechanically-disturbed areas.
4. Erosion control and site restoration measures will be initiated as soon as a particular area is no longer needed for exploration, production, staging, or access. Disturbed areas will be re-contoured to provide proper drainage.

Vegetation

1. Where seeding is required, use appropriate seed mixture and seeding techniques approved by Reclamation.
2. Keep removal and disturbance of vegetation to a minimum through construction site management.
3. Reclaim areas with native seeds that are representative of the indigenous species present in the adjacent habitat. In all cases, ensure seed mixtures are approved by Reclamation prior to planting.
4. Certify that all interim and final seed mixes, hay, straw, and hay/straw products are free of noxious weed species.
5. Desirable trees will be planted along drainage corridors to restore habitat lost during construction activities. An area is considered to be satisfactorily reclaimed when all disturbed areas have been re-contoured to blend with the natural topography, erosion has been stabilized, and a 70% acceptable vegetative cover has been established.

Noxious Weeds

1. To reduce the potential for the introduction of noxious weeds, clean off all equipment with pressure washing prior to operating. Removal of all dirt, grease, and plant parts that may carry noxious weed seeds or vegetative parts is required and may be accomplished off site with a pressure hose.
2. Ensure all seed, hay, straw, mulch, or other vegetation material transported and used in the disturbed areas are free of noxious weed

- seeds as certified by a qualified federal, state, or county officer.
3. Contractor will be held accountable if new invasive species are introduced into the disturbance areas due to improper cleaning of equipment.

Migratory Birds

1. If construction were to occur within the migratory bird-breeding season (March 1 – August 31) and potential migratory bird habitat exists, presence/absence surveys would be required and if nests are encountered, they would be avoided.

Cultural Resources

1. Archeologist must be present during excavation from borrow areas to monitor for cultural resources.

Attachment B

Environmental Coordination



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Oklahoma Ecological Services Field Office
9014 EAST 21ST STREET
TULSA, OK 74129
PHONE: (918)581-7458 FAX: (918)581-7467
URL: www.fws.gov/southwest/es/Oklahoma/

Consultation Code: 02EKOK00-2015-SLI-1066

May 18, 2015

Event Code: 02EKOK00-2015-E-01142

Project Name: Altus Dam Corrective Action Study

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Non-federal entities conducting activities that may result in take of listed species should consider seeking coverage under section 10 of the ESA, either through development of a Habitat Conservation Plan (HCP) or, by becoming a signatory to the General Conservation Plan (GCP) currently under development for the American burying beetle. Each of these mechanisms provides the means for obtaining a permit and coverage for incidental take of listed species during otherwise lawful activities.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit through our Project Review step-wise process <http://www.fws.gov/southwest/es/oklahoma/OKESFO%20Permit%20Home.htm>.

Attachment



United States Department of Interior
Fish and Wildlife Service

Project name: Altus Dam Corrective Action Study

Official Species List

Provided by:

Oklahoma Ecological Services Field Office

9014 EAST 21ST STREET

TULSA, OK 74129

(918) 581-7458

<http://www.fws.gov/southwest/es/Oklahoma/>

Consultation Code: 02EKOK00-2015-SLI-1066

Event Code: 02EKOK00-2015-E-01142

Project Type: DAM

Project Name: Altus Dam Corrective Action Study

Project Description: The project is located in Greer and Kiowa County, Oklahoma. An Environmental Assessment (EA) is being prepared to assess the environmental effects of conducting corrective actions as Altus Dam and Dikes. The corrective actions include raising the dikes to crest elevation 1573 and backfilling the drainage trench with sand filter material at Lugert Dike and East Dike B. The EA is project to be completed September 2015.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

<http://ecos.fws.gov/ipac>, 05/18/2015 12:40 PM

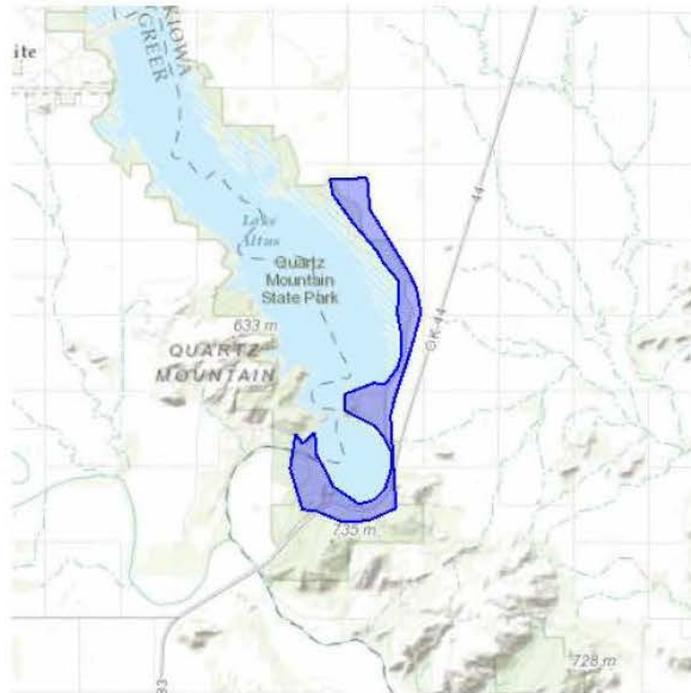
1



United States Department of Interior
Fish and Wildlife Service

Project name: Altus Dam Corrective Action Study

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Greer, OK | Kiowa, OK

<http://ecos.fws.gov/ipac>, 05/18/2015 12:40 PM



United States Department of Interior
Fish and Wildlife Service

Project name: Altus Dam Corrective Action Study

Endangered Species Act Species List

There are a total of 6 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Black-Capped Vireo (<i>Vireo atricapilla</i>) Population: Entire	Endangered		
Least tern (<i>Sterna antillarum</i>) Population: interior pop.	Endangered		Towers (i.e. radio, television, cellular, microwave, meterological)Wind Turbines and Wind Farms
Piping Plover (<i>Charadrius melodus</i>) Population: except Great Lakes watershed	Threatened	Final designated	
Red Knot (<i>Calidris canutus nufa</i>)	Threatened		
Sprague's Pipit (<i>Anthus spragueii</i>)	Candidate		
Whooping crane (<i>Grus americana</i>) Population: except where EXPN	Endangered	Final designated	

<http://ecos.fws.gov/ipac>, 05/18/2015 12:40 PM



United States Department of Interior
Fish and Wildlife Service

Project name: Altus Dam Corrective Action Study

Critical habitats that lie within your project area

There are no critical habitats within your project area.

The accuracy of this official species list was verified on February 5, 2016 and the species list is still current.

<http://ecos.fws.gov/ipac>, 05/18/2015 12:40 PM



Oklahoma Archeological Survey

THE UNIVERSITY OF OKLAHOMA

Handwritten initials: JT, KE, KE

RECEIVED

JUN 23 2015

Department of Reclamation
Oklahoma City, OK

June 19, 2015

Jeff Tompkins
Supervisor, Land Resources Group
Bureau of Reclamation
Oklahoma – Texas Area Office
Oklahoma City Field Office
5924 NW 2nd Street, Suite 200
Oklahoma City, OK 73127-6514

Re: Proposed dam corrective action: raising earthen dikes, W. C. Austin Project. Legal Description: Sections 14, 23, 26, and 27 T5N R20W, Greer and Kiowa Counties, Oklahoma (archaeological investigations).

Dear Mr. Tompkins:

I have received a report documenting the results of a cultural resources inventory completed for the above referenced action. These include two borrow areas, a soil disposal location, and an access road. Kate Ellison performed the work on these four locations on April 15-17, and 24, 2015. The examination of some 65 acres representing the area of potential effect found no evidence of archaeological resources. It is my opinion that the proposed raising of the earthen dikes will not affect archaeological sites. **However, the W. C. Austin Project has been determined eligible for the National Register. I defer opinion on the effect of raising the dikes to the State Historic Preservation Office.**

This review has been conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society.

Sincerely,

Robert L. Brooks
State Archaeologist

Cc: SHPO





Oklahoma Historical Society
State Historic Preservation Office

Founded May 27, 1893

Oklahoma History Center • 800 Nazih Zuhdi Drive • Oklahoma City, OK 73105-7917
(405) 521-6249 • Fax (405) 522-0816 • www.okhistory.org/shpo/shpom.htm

ST
KE

August 28, 2015

Mr. Jeff Tompkins
Supervisor, Land Resources Group
Bureau of Reclamation Oklahoma City Field Office
5924 N.W. 2nd Street, Suite 200
Oklahoma City, OK 73127

RECEIVED

AUG 31 2015

Bureau of Reclamation
Oklahoma City, OK

RE: File #1678-15; BOR Proposed Dam Safety Study for W.C. Austin Project; Greer, Kiowa & Jackson Counties, Oklahoma

Dear Mr. Tompkins:

We have reviewed the documentation submitted on the referenced project. We concur with your opinion that the proposed project to raise the five dikes (North Dike, East Dike, Lugert Dike, South Dike, and Auxiliary Dike) which are contributing resources to the W.C. Austin Irrigation Project, will have no adverse effect on the W.C. Austin Irrigation Project that is eligible for the National Register of Historic Places.

Unless you receive an objection from any other consulting party during the comment period pursuant to 36 CFR Part 800.5(c)(1), this correspondence documents that your agency has completed the Section 106 process in accordance with the Advisory Council on Historic Preservation's regulations (36 CFR Part 800).

Thank you for the opportunity to review this project. Future correspondence pertaining to this project must reference the above underlined file number.

If you have any questions, please do not hesitate to call Ms. Catharine Wood, Historical Archaeologist, at (405) 521-6381. Thank you.

Sincerely,

Melvena Heisch
Deputy State Historic
Preservation Officer

MH:pm

Attachment C

LAWS, REGULATIONS, and EXECUTIVE ORDERS ASSOCIATED WITH THE SAFETY OF DAMS MODIFICATIONS AT THE DIKES AT LUGERT-ALTUS RESERVOIR

List of Laws, Regulations, and Executive Orders that have a special application associated with the Safety of Dams Modifications at the dikes at Lugert-Altus Reservoir:

1. **Reclamation Safety of Dams Act of 1978** – Authorizes the Secretary of the Interior to perform modifications to preserve structural safety of Reclamation dams and related facilities.
2. **Endangered Species Act of 1973 (P.L. 93-205)** – Section 7 of this Act requires Reclamation to ensure that all federally associated Reclamation activities within the United States do not have adverse impacts on the continued existence of threatened or endangered species or on designated critical habitats. Reclamation will consult with the U. S. Fish and Wildlife Service to determine potential impacts a project may have on protected species.
3. **National Historic Preservation Act of 1966 (P.L. 89-665), as amended (P.L. 95-515)** – An evaluation will be conducted prior to any construction activities to determine whether a proposed action will affect sites or structures listed in or eligible for listing in the National Register of Historic Places (National Register). If any are found, it is then determined whether the project effects are adverse.
4. **Presidential Memorandum “Government-to-Government Relations with Native American Tribal Governments.” April 29, 1994.** Clarifies the responsibility to ensure that the federal government operates within a government-to-government relationship with federally recognized Native American tribes.
5. **Executive Order 11988** – requires each Federal agency to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands, and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities; and to determine whether the proposed action will occur in a flood plain, consider alternatives, and if no practical alternative is found, it requires minimizing harm, notifying the public why the action must be located in the flood plain, and provides for public review and comment.
6. **Executive Order 11990** – protection of wetlands, provides for a process to improve and coordinate Federal plans, functions, programs, and resource use in a

manner to attain beneficial use without impacting on wetlands by requiring the agency head to find that there are no practical alternatives to such construction and that the proposed action includes all practical measures to minimize impacts to wetlands.

7. **Executive Order 12898** - “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.” Requires each Federal agency (specifically in EISs) to “provide full and fair discussions of significant environmental impacts and shall inform decision-makers and the public of reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment” (40 CFR §1502.1)

8. **Secretarial Order 3226** – “Evaluating Climate Change Impacts in Management Planning” dated January 19, 2001. This SO ensures that climate change impacts area taken into account in connection with Departmental planning and decision making.