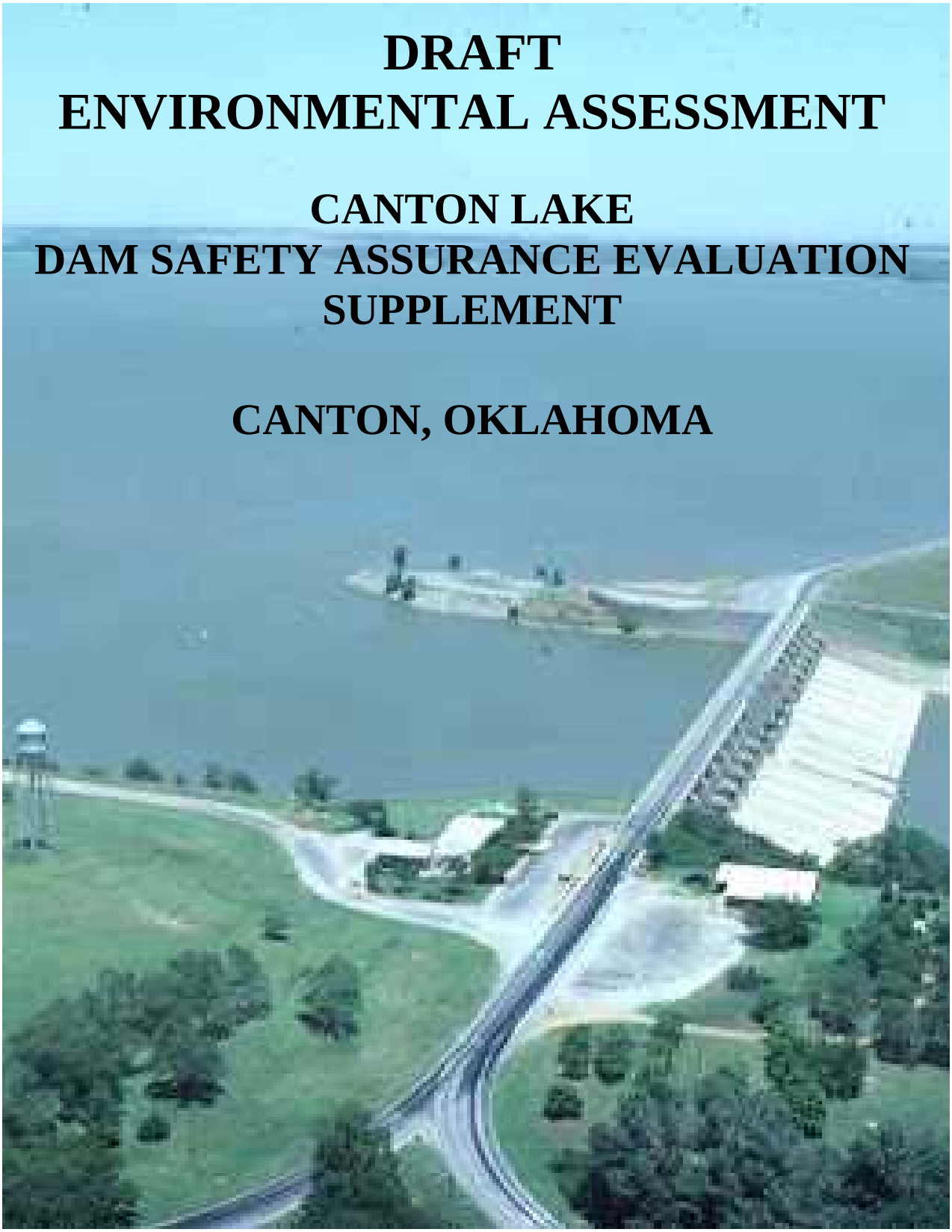
DRAFT
ENVIRONMENTAL ASSESSMENT

CANTON LAKE
DAM SAFETY ASSURANCE EVALUATION SUPPLEMENT

CANTON, OKLAHOMA



DECEMBER 2006

US Army Corps
of Engineers
Tulsa District

FINDING OF NO SIGNIFICANT IMPACT

Decision: I have reviewed the Environmental Assessment for this project using criteria identified in the implementing regulations for the National Environmental Policy Act (40 CFR 1508.27) including guidelines in 33 Code of Federal Regulations, Part 230. I have considered these criteria in terms of both context and intensity. Based on the EA and the Findings required by other laws, I have determined that this is not a major action that would have significant effect on the human environment and therefore does not require the preparation of an EIS. The following criteria were considered:

1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect would be beneficial
2) The degree to which the proposed action affects public health and safety.
3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmland, wetlands, wild and scenic rivers, or ecologically critical areas.
4) *The degree to which the effects on the quality of the human environment are likely to be highly controversial.*
5) *The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*
6) *The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*
7) *Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.*
8) *The degree to which the action may adversely affect districts, sites, highways, structures or objects listed in or eligible for listing in the National register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources.*
9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
10) Whether the action threatens a violation of Federal, State or local law or requirements imposed for the protection of the environment.

Project Purpose and Need: The U.S. Army Corps of Engineers (USACE) proposes to modify the existing dam embankment at Canton Lake to adequately convey floodwaters of a 100% Probable Maximum Flood (PMF) into the North Canadian River tailwater.

The stability of the Canton Dam spillway and the amount of floodwater the dam can safely hold has been the subject of concern and discussion for over 30 years. The lake currently operates with restrictions on the amount of water the Dam can safely hold. These restrictions affect the dam's ability to provide flood protection to the level for which it was designed. Due to these restrictions, downstream flooding could occur.

Project Location: Canton Lake is located in Blaine County, Oklahoma. The dam is located on the North Canadian River at river mile 394.3, about two miles north of the city of Canton and 75 miles northwest of Oklahoma City. The project location is at the damsite in Section 27, Township 19 North, Range 13 West, Blaine County, Oklahoma. Construction of Canton Dam began in 1940 and was completed January 1948. The elevation at the top of the flood control pool is 1638.0 mean sea level (msl), with a flood control capacity of 377,100 acre-feet. The conservation pool elevation is 1615.0 msl. The lake extends into Blaine and Dewey counties in Oklahoma.

Proposed Project: The proposed plan consists of constructing an auxiliary spillway containing 9 fusegates with a sill elevation of 1610.0. The excavated material from constructing the auxiliary spillway would be spoiled below the existing left embankment. The spoil berm would run the length of the left embankment and would extend to a maximum width of 600-ft. The berm would serve to address seepage and seismic issues. Highway 58A would be realigned to accommodate the new spillway alignment (reference figure 2-3 of the EA for project features).

Project Impacts and Mitigation: Project related impacts were identified during alternative formulation and data gathering for the environmental assessment and coordination with the US Fish and Wildlife Service and the Oklahoma Department of Wildlife Conservation. The proposed plan would impact the following:

LOCATION		TOTAL ACREAGE
Project Lands		**83.5 acres**
Blaine's Park (Frank Raab Nature Trail)	34 acres	
Riverside Park (Prairie Dog Town)	32 acres	
Other (Highway realignment)	17.5 acres	
ODWC Licensed Land		**111 acres**
Wetlands	5.5 acres	
Farmland	20 acres	
Forest	85.5 acres	
Total Lands Impacted		**194.5 acres**

. To offset the losses, the USACE plans to implement the following measures:

(a) Ensure water flow to the wetlands downstream from the proposed berm. This would be accomplished by installing relief wells in the vicinity of the wetlands that would supply water to the wetlands.

(b) Acquire 20 acres located on Canton Lake for wildlife management

(c) Provide funds to ODWC for natural resource improvements such as aquatic habitat restoration, invasive species control, wetland creation, native prairie and bottomland hardwood restoration. The exact funds provided to ODWC would be based on the value of the land impacted minus other environmental improvements implemented by USACE as mitigation for implementation of the proposed plan.

(d) Seed the berm with native prairie grass seed mix.
(e) Construct two bald eagle roosting platforms at a location designated by USFWS.
(f) Relocate prairie dog town to a location designated by ODWC

Mitigation measures would be implemented by the USACE to eliminate or reduce impacts as defined in 40 CFR 1508.20.

Conclusion: On behalf of the U.S. Army Corps of Engineers, I have decided to proceed with actions required to implement the proposed plan at Canton Lake, Oklahoma. I have carefully considered the environmental assessment and the findings required by other laws and I have determined that this is not a major action that would have significant effect on the human environment and therefore does not require the preparation of an EIS.

_____
Date

Miroslav P. Kurka
Colonel, U.S. Army
District Engineer

Enclosure: Environmental Assessment

ENVIRONMENTAL ASSESSMENT ORGANIZATION

This Environmental Assessment (EA) evaluates the effects of modifying the existing dam embankment at Canton Lake, Oklahoma to adequately convey floodwaters of a 100% Probable Maximum Flood. This EA will facilitate the decision process regarding the proposed action and alternatives.

SECTION 1	*PURPOSE, NEED AND SCOPE* of the proposed action summarizes the purpose of a need for the proposed action, provides relevant background information and describes the scope of the EA.
SECTION 2	*ALTERNATIVES INCLUDING PROPOSED ACTION* examines alternatives for implementing the proposed action and describes the recommended action.
SECTION 3	*AFFECTED ENVIRONMENT* describes the existing environmental and socioeconomic setting *ENVIRONMENTAL CONSEQUENCES* identifies the potential environmental and socioeconomic effects of implementing the proposed action and alternatives. *MITIGATION PLAN* summarizes mitigation actions required to enable a Finding of No Significant Impact for the proposed alternative.
SECTION 4	*APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS* provides a listing of environmental protection statutes and other environmental requirements.
SECTION 5	*FEDERAL, STATE AND LOCAL AGENCY COORDINATION* provides a listing of individuals and agencies consulted during preparation of the EA.
SECTION 6	*LIST OF PREPARERS* identifies persons who prepared the document and their areas of expertise.
SECTION 7	*REFERENCES* provides bibliographical information for cited sources
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DRAFT

Environmental Assessment

Canton Lake, Oklahoma

Dam Safety Assurance Evaluation Supplement

1.0 Purpose. The U.S. Army Corps of Engineers (USACE) proposes to modify the existing dam embankment at Canton Lake to adequately convey floodwaters of a 100% Probable Maximum Flood (PMF) into the North Canadian River tailwater. The National Weather Service defines the Probable Maximum Flood as the flood that can be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in a region. It is determined through a statistical formula used to calculate a hypothetical flood event that could occur on a particular river basin over a particular duration. The study area includes the reservoir above Canton Dam up to the maximum pool caused by the PMF and downstream to Oklahoma City, Oklahoma.

1.1 Need. The stability of the Canton Dam spillway and the amount of floodwater the dam can safely hold has been the subject of concern and discussion for over 30 years. The lake currently operates with restrictions on the amount of water the Dam can safely hold. These restrictions affect the dam's ability to provide flood protection to the level for which it was designed. Due to these restrictions, downstream flooding could occur.

The 2002 Dam Safety Assurance Program Evaluation Report was approved by Headquarters and cited identification of two serious and interrelated deficiencies:

(1) Inadequate factors of safety against sliding of the spillway structure and
(2) Inadequate discharge capacity when routing the PMF resulting in overtopping of the embankment.

In 2003, the USACE initiated detailed evaluations of the interrelated hydrologic, geotechnical, and financial issues of the fuse gates and added evaluations of tainter gate alternatives. Based on the results, the recommendation was to move the auxiliary spillway location to the right abutment and evaluate alternatives consisting of various design widths utilizing fuse gates or tainter gates.

In September 2005, the USACE Screening Portfolio Risk Analysis report detailed findings from a nationwide assessment of Corps of Engineers dams identifying Canton Dam as a moderately high risk dam due to seepage and seismic issues in the left embankment.

Prior to October 2006, the existing spillway was not stable against sliding with the spillway gates closed for pool elevations greater than 1626.0 National Geodetic Vertical Datum (NGVD). Consequently, the flood control storage is reduced from 1638.0 NGVD (top of flood control pool) to elevation 1626.0 NGVD.

Objectives. The main objectives of the Dam Safety Assurance Study are to:

- Meet the Base Safety Condition (BSC) in accordance with Engineer Regulation (ER) 1110-2-1155.
- Meet the "State of the Art" design criteria.

The BSC is determined by comparing loss of life for various floods, expressed as percentages of the PMF, beginning with the Threshold Flood. The Threshold Flood is defined as the flood that fully utilizes the existing dam. The TF for Canton Lake is equivalent to 59.5 percent of the PMF assuming full spillway discharge capacity with all the tainter gates fully open. The 2001 Dam Safety Report demonstrated that incremental loss of life occurs at all floods from the threshold flood to 100 percent of the PMF, establishing the BSC at 100 percent of the PMF.

State of the art design criteria represents a culmination of the best technology and experience that is available today. It was common and acceptable practice during the 1940's to assume substantial values of cohesion and phi angle for design of structures founded in shales. Testing techniques at the time indicated artificially high strengths resulting in the assumed high strength values. Experience with failures, unacceptable performance of structures, and greater understanding of the strength parameters and how they should be derived have led away from assigning cohesion to clay shale materials when evaluating long term stability. The strength parameters recommended today reflect these changes in the state-of-the-art.

1.2 Project Area. Canton Lake is located in Blaine County, Oklahoma (figure 1-1). The dam is located on the North Canadian River at river mile 394.3, about two miles north of the city of Canton and 75 miles northwest of Oklahoma City. The project location is at the damsite in Section 27, Township 19 North, Range 13 West, Blaine County, Oklahoma. Construction of Canton Dam began in 1940 and was completed January 1948. The elevation at the top of the flood control pool is 1638.0 mean sea level (msl), with a flood control capacity of 377,100 acre-feet. The conservation pool elevation is 1615.0 msl. The lake extends into Blaine and Dewey counties in Oklahoma.

1.3 Authority for the Study. The Flood Control Act of June 28, 1938 (Public Lake 761) authorized the construction of Canton Dam. Authorization was further modified by the Flood Control Act of July 24, 1946 to add irrigation storage and the Flood Control Act of June 30, 1948 to add municipal water supply storage as project purposes. The Water Resources Development Act of 1990 authorized converting all irrigation storage to municipal and industrial water supply storage and for reassignment from the city of Enid, Oklahoma to Oklahoma City. The authorized project purposes for Canton Lake are flood control, water supply and irrigation. Oklahoma City obtains its water supply by contract from Canton Lake. They are allocated 90,000 acre-feet of water, with an estimated 12 million gallons per day yield.

1.4 National Environmental Policy Act. The National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190) requires all Federal agencies to address

environmental consequences of major Federal actions on the natural and human environment. Compliance guidance for NEPA is contained in Title 40 of the Code of Federal Regulations (CFR), Parts 1500 through 1508, and in the U.S. Army Corps of Engineers regulations 33 CFR 230, *Procedures for Implementing NEPA*. The primary intent of NEPA is to ensure that environmental information is made available to public officials and citizens regarding major actions taken by Federal agencies.

An Environmental Impact Statement (EIS) for operation and maintenance of Canton Lake was finalized March 1976. A Final Environmental Assessment and Finding of No Significant Impact (FONSI) for modifying the Canton Dam and spillway with fuse gates in the left embankment was signed March 9, 2001 (Appendix E).

In 2003, the USACE began further analysis of the proposed plan (fuse gates in the left embankment) involving detailed evaluations of the interrelated hydrologic, geotechnical and financial issues of the fuse gates and also added evaluations of tainter gate alternatives. The recommendation resulting from the in-depth analysis was to move the auxiliary spillway from the left embankment to the right abutment and evaluate alternatives consisting of various design widths utilizing fuse gates or tainter gates.

This EA is a supplement to the 2001 EA and FONSI because it expands on the alternative formulation process analyzing structural alternatives in the right abutment. Several structural alternatives addressed in the final 2001 EA were considered to remedy the hydraulic deficiency of the embankment, but were not carried forward for further analysis because they either did not meet the design criteria or were not cost effective. Alternatives considered in the previous EA included raising the dam with and without freeboard; uncontrolled spillway; fusegated spillway; fuse plug spillway, dike 1; and fuse plug spillway, left embankment.

In September 2005, the USACE Screening Portfolio Risk Analysis Report detailed findings from a nationwide assessment of Corps of Engineers dams identifying Canton Dam as a moderately high risk dam due to seepage and seismic issues in the left embankment. In 2006, the USACE continued to refine recommendations' to move the auxiliary spillway from the left embankment to the right abutment and evaluate alternatives consisting of various design widths utilizing fuse gates or tainter gates. This EA evaluates those alternatives and their effects on the environment.

1.5 Public Involvement. Agency mailings concerning the project and request for information were mailed on March 17, 2006. A project meeting was held with U.S. Fish and Wildlife Service (USFWS) and the Oklahoma Department of Wildlife Conservation (ODWC) on August 29, 2006 to discuss the details of the project and potential issues of concern. A scope of work and agreement was established with the USFWS in accordance with the Fish and Wildlife Coordination Act. See appendix D for a copy of their report.

Figure 1-1 Location Map

Announcements concerning the study and upcoming public workshop were distributed in the Canton Times on September 21, 2006; the Enid News and Eagle on September 24, 2006 and the Daily Oklahoman on September 24, 2006 (Appendix A).
Scoping workshops were held during the fall of 2000 to encourage public involvement in the NEPA process for preparation of the initial Environmental Assessment completed in 2001. Due to project design changes and further analysis, an additional scoping workshop was held on September 27, 2006 at the Canton Community Building in Canton, Oklahoma. Twenty-three people attended the workshop. Issues of concern expressed at the workshop and by stakeholders and resource agencies are listed below:

Key Issues:

- The prairie dog town located within the proposed spillway alignment.
- Access to the Coast Guard tower and grazing lease for the ODWC during construction.
- Café located south of the Dam.
- Recreation areas in the project vicinity.
- Wildlife management lands leased to ODWC.
- Wetlands located below the left embankment.
- Water supply availability during construction
- Lake levels during construction

1.6 Decision to be Made. Under the NEPA, the USACE is charged with determining the impacts of the alternatives and whether they meet the threshold of significance. The Tulsa District Commander would decide whether a FONSI could be signed or if an Environmental Impact Statement should be prepared. The decision would include:

- The location, design and scheduling for the proposed project,
- Mitigation measures and monitoring requirements,
- The intensity of the effects and
- If a FONSI can be prepared and approved.

The plan selected would be the best alternative that safely passes the PMF, addresses the seismic issues and meets the "state of the art" design criteria as it is established today.

1.7 Federal and State Permits, Licenses and Certifications. To proceed with the proposed plan, various permits are required from federal and state agencies.

Approval of discharge of dredged or fill material into waters of the United States, Section 404 of the Clean Water Act, as amended is required from the regulatory office of the USACE. They have reviewed the proposed project and have determined that there are no jurisdictional wetlands that would be impacted by construction of the project. They have also determined that a nationwide permit for temporary construction access and dewatering (Nationwide Permit 33) is required for construction of the temporary road below the existing spillway that would place fill material in the tailwater below the dam (Appendix C).

A storm water discharge permit in relation to the National Pollution Discharge Elimination System (NPDES) from the Oklahoma Department of Environmental Quality is required for construction activities exceeding one (1) acre.

1.8 Applicable Laws and Executive Orders. Shown below is a list of applicable federal laws and executive orders pertaining to project specific planning and environmental analysis on federal lands. Disclosures and findings required by these laws and orders are contained in Chapter 3 of this EA

.Archeological and Historic Preservation Act, 1974, as amended, 16 U.S.C. 469
Clean Air Act, as amended, 42 U.S.C. 7609
Clean Water Act, 1977, as amended (Federal Water Pollution Control Act), 33 U.S.C. 1251
Endangered Species Act, 1973, as amended, 16 U.S.C. 1531
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1-12
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661
Land and Water Conservation Fund Act, 1965, as amended, 16 U.S.C. 4601
National Historic Preservation Act, 1966, as amended, 16 U.S.C. 470a
National Environmental Policy Act, as amended, 42 U.S.C. 4321
Native American Graves Protection and Repatriation Act, 1990, 25 U.S.C. 3001-13
Rivers and Harbors Act, 33 U.S.C. 401
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271
Water Resources Planning Act, 1965
Floodplain Management (E.O. 11988)
Protection of Wetlands (E.O. 11990)
Environmental Justice (E.O. 12898)
Protection of Children (E.O. 13045
Farmland Protection Policy Act, 7 U.S.C. 4201

2.0 ALTERNATIVES. This Chapter will discuss the range of alternatives considered and compare the alternatives in terms of their environmental impacts and their achievement of objectives as stated in Chapter 1.

Several alternative plans were considered during formulation of the project. The EA prepared in 2001 addressed 10 alternative plans dealing with the left abutment. Due to further analysis and determination that the selected plan did not achieve the project objectives, the **right abutment was selected as the best location for an auxiliary spillway** and seven right abutment alternatives were considered for further analysis. The alternatives recommended for detailed analysis are addressed first, followed by a brief discussion of the alternatives considered but eliminated from additional study.

Project features common to each alternative considered (except the No Action alternative) include:

- Temporary road across the tailwater for contractor vehicular access. This road would be constructed utilizing rock materials and culverts to allow passage of water. This road would be removed once construction was complete.

- Auxiliary spillway along the right abutment (figure 2-3). Once the auxiliary spillway features are constructed, the earthen plug would be removed. Thirty-four acres of recreational area would be impacted by the new alignment
- Realigning highway 58A (figure 2-3). The realignment would impact 17.5 acres

2.1 Alternatives Considered for Detailed Study. Seven right abutment alternatives were evaluated; three with tainter gates (alternatives T.1, T.2 and T.3) and four with fuse gates (alternative F.1a, F.1b, F.2, and F.3) in combination with three separate spoil locations. The three spoil locations evaluated consisted of one along the north side of the lake (off-site), another on the south side of the lake (offsite) and a third location below the left embankment (on-site) (figure 2-1).

Each abutment alternative considered was based on a unique sill elevation and spillway width. Fuse gate alternatives F.1a and F.1b have the same gate configuration; however, alternative F.1a considers spoiling the excavated material at the toe of the left embankment and F.1b considers spoiling the material at an off-site location.

2.1.1 No Action Alternative. Under this alternative, no Federal Action would be taken and the project would continue to operate under current conditions. This alternative does not meet the study objectives.

Engineer Regulation 1110-2-1155 states that the recommended plan for a dam safety modification should be one that meets or exceeds the Base Safety Condition. For Canton Dam, the PMF is identified as the Base Safety Condition.

Under the "No Action" alternative, the project would continue to operate with a threshold flood of 59.5 percent of the PMF. What this means is that the dam currently can safely release approximately 339,200 cubic feet per second (cfs) or restated anther way, the dam **can operate safely at a flood that reaches 59.5% of the PMF.** To release 100% of the PMF, the dam would need to safely discharge 634,065 cfs.

According to the March 2001 Corps report, floods in excess of 59.5% of the PMF could cause dam failure. The Canton Lake PMF would overtop the design top of the dam at elevation 1648.0. The PMF would be routed on top of a full flood pool (elevation 1638.0) resulting in a maximum elevation of 1649.7. This routing **assumes** that the pool can reach elevation 1638.0 during an antecedent storm. Current regulating constraints restrict operating the lake to a maximum pool elevation of 1626.0 and require initiating releases that equal water flowing into the lake above this elevation. This constraint dramatically affects the hydrologic capability of the Canton Project.

The current regulated flood pool elevation has an average recurrence interval of 18 years, instead of the needed 67 years at the top of the flood control pool. Consequently, the current spillway is not stable for pools higher than the base safety condition with the gates closed. In order to retain the current spillway, releases would have to be made from the dam when the flood pool reached elevation 1626.0.

If this were to occur, the floodwaters would damage or destroy structures, their contents and result in possible loss of life. There would be large socio-economic impacts that are explained in more detail in Chapter 3 of this EA.

Headquarters USACE questioned the stability of the spillway structure against sliding during an inspection in December 1973. The spillway structure was constructed on weak clay shale. Based on analysis conducted, the spillway structure did not provide stable discharge capability. As a result, rock anchors were installed in 2006.

2.1.1.1 Alternative's Effect on Key issues:

- The prairie dog town located at Riverside Park would continue to thrive.
- Access to the Coast Guard tower and grazing lease managed by the ODWC would follow its current alignment.
- The Café located south of the dam would continue to operate.
- The recreation areas in the project vicinity would continue to be maintained.
- ODWC would continue to manage the lands for wildlife management.
- The wetlands located below the left embankment would continue to function and develop.
- Water supply would not be interrupted
- Lake levels would follow the general patterns that have been established by past and current operations.

2.1.2 Spoil Location Component. Three separate spoil locations were evaluated; one along the north side of the lake (off-site), a second on the south side of the lake (off-site) and one below the left embankment (on-site).

2.1.2.1 Off-site spoil locations. Two off-site locations were considered for placement of the spoil material. Reference figure 2-1 for exact location of the sites considered. While the off-site spoil locations meet the project objectives, they would not provide the added benefit of addressing the seepage and seismic issues. The off-site spoil locations were also considered not to be economically feasible and therefore were not analyzed further.

Approximately 5,580,000 cubic yards of material would be excavated and relocated resulting from construction of the auxiliary spillway. Potential disposal sites need to accommodate spoil material that would cover approximately a quarter section of land (0.5 miles x 0.5 miles) 22-feet deep. Suitable off-site locations were investigated utilizing existing topographic and land use maps.

All of the potential disposal sites identified requires transporting the material distances greater than 10 miles on roadways that are not suitable for heavy truck traffic for extended periods of time. Utilizing these roads would require upgrading them to withstand heavy truck traffic followed by restoration to their original condition once the project was complete. In addition, these "off-site" disposal areas were originally set-aside for wildlife management purposes to compensate for lands lost resulting from

construction of the lake. After the spoil material is placed, it could be reseeded with native grasses and made available for wildlife use in the future. Adverse impacts to the natural resources at the disposal sites would require mitigation.

2.1.2.1.1 Components Effect on Key issues:

- The prairie dog town located at Riverside Park is within the alignment of the new spillway. The prairie dogs would be relocated to a nearby site.
- Access to the Coast Guard tower and grazing lease managed by the ODWC would be routed around the new spillway alignment.
- The Café located south of the dam would not be affected by this component.
- Blaine Park and the Frank Raab nature trail would not be affected by this component.
- The locations identified are currently licensed to ODWC for wildlife management. One hundred sixty acres would be adversely affected for the short-term. The spoiled material would be reseeded with native grasses and forbs and would be available for wildlife management in the long-term.
- Wetlands would be avoided and not impacted by this component.
- Water supply would not be interrupted.
- There would be no impact to lake levels resulting from implementation of this alternative.

2.1.2.2 On-site spoil location. This component would meet project objectives and would be the most cost effective alternative, plus it has the additional benefit of addressing the seismic and seepage concerns identified by the Screening Portfolio Risk Analysis. On-site disposal would involve utilizing the 5,580,000 cubic yards of excavated material to construct an earthen berm along the toe of the left embankment immediately adjacent to the spillway (figure 2-3, project features). The maximum extent of the berm would be 600-ft wide. The material would be transported for short distances across government property.

2.1.2.2.1 Components Effect on Key issues:

- The prairie dog town located at Riverside Park is within the alignment of the new spillway. The prairie dogs would be relocated to a nearby site.
- Access to the Coast Guard tower and grazing lease for the ODWC would be routed around the alignment for the auxiliary spillway.
- The Café located south of the dam would not be affected by this alternative.
- Portions of Blaine Park and the Frank Raab nature trail would be adversely impacted by implementation of this alternative.
- One hundred and eleven acres of the 695 acres ODWC has licensed below the dam for wildlife management would be permanently impacted by construction of this component. The spoiled material would be reseeded with native grasses and forbs.

- Approximately 5.5 acres of wetlands would be permanently affected by implementation of this component.
- Water supply would not be interrupted
- There would be no impact to lake levels resulting from implementation of this alternative.

2.1.3 Structural Component. Seven right-abutment alternatives were evaluated; three with tainter gates and four with fuse gates. Each alternative is based on a unique sill elevation and spillway width.

2.1.3.1 Tainter gates in the right abutment. Three alternatives consisting of tainter gates in the right abutment were evaluated (T.1, T.2, and T.3). Each of these alternatives meets the project objectives.

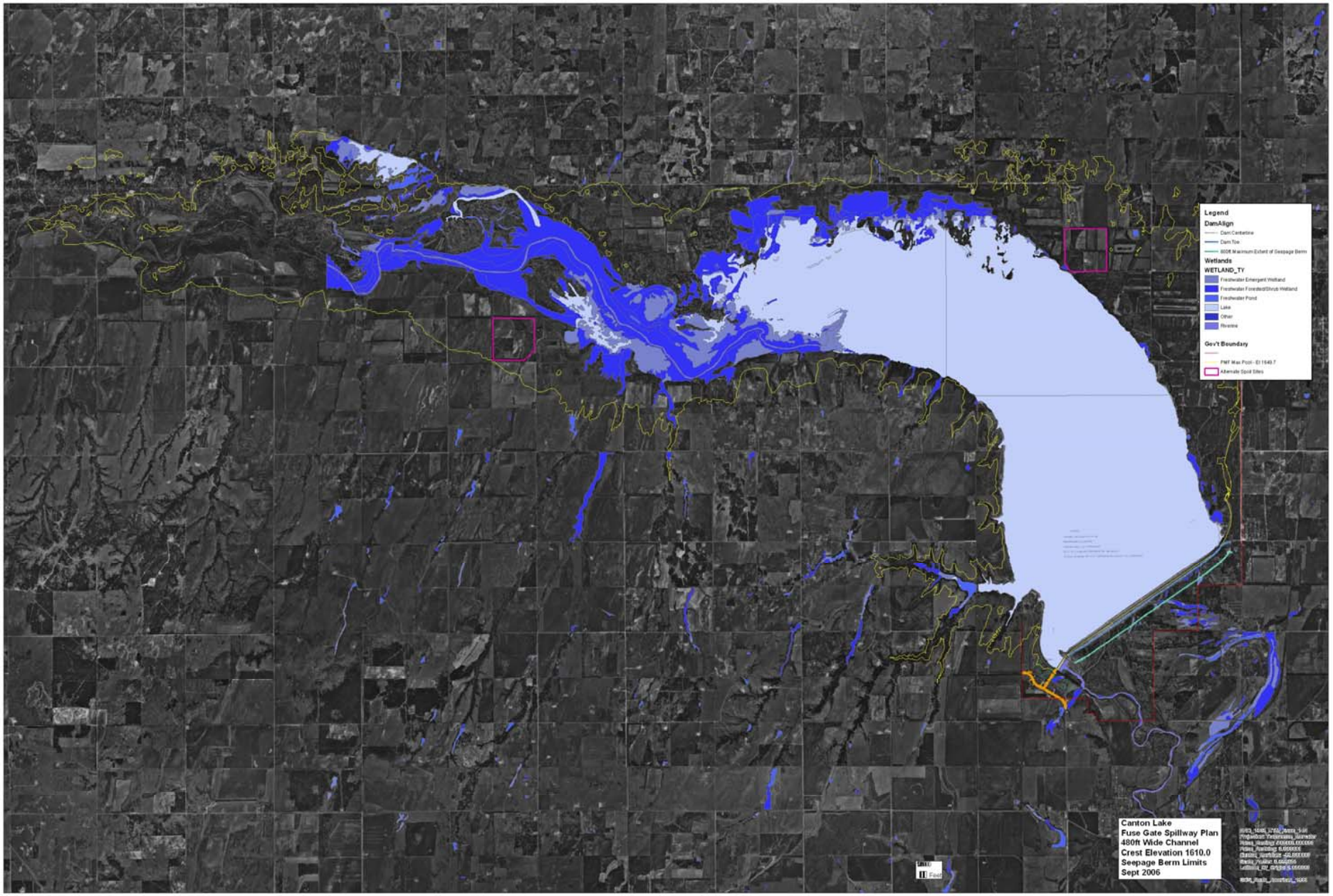
T.1 - Tainter Gates, Sill Elevation 1601.5. This alternative consists of five, 50-foot wide tainter gates on an ogee weir with the sill elevation at 1601.5. The total estimated excavation quantity is 4,080,390 cubic yards spoiled at the toe of the dam's left embankment. A bridge across the new spillway would serve as both a highway and service bridge.

T.2 – Tainter Gates, Sill Elevation 1605.9. This alternative consists of six, 50-foot wide tainter gates on an ogee weir with the sill elevation at 1605.9. the total estimated excavation quantity is 4,070,443 cubic yards spoiled at the toe of the dam's left embankment. A bridge across the new spillway would serve as both a highway and service bridge.

T.3 – Tainter Gates, Sill Elevation 1609.3. This alternative consists of six, 50-foot wide tainter gates on an ogee weir with the sill elevation at 1609.3. The total estimated excavation quantity is 4,948,677 cubic yards spoiled at the toe of the dam's left embankment. A bridge across the new spillway would serve as both a highway and service bridge.

2.1.3.2 Fuse gates in the right abutment. Four alternatives were evaluated consisting of fuse gates in the right abutment. The alternatives varied in the number of fuse gates, sill elevation and location for deposition of spoil material. Each fuse gate is 30 feet wide by 13 feet tall. An advantage of a fuse gated spillway versus tainter gates are that they require less maintenance than tainter gates, reduce channel armoring requirements and still provide for release in case of 100% PMF. Fuse-gates are designed to tip at predetermined staggered elevations. The staggered tipping of the fuse gates in combination with the operation of the existing gated spillway allows some control of the outflow during events resulting in pool elevations greater than 1640.0 but less than a true PMF event. Figure 2-2 is a picture of fusegates installed at Kaweah Lake, Visalia, California. The various fusegate alternatives are:

Figure 2-1 Spoil Site Locations



F.1a -, Fusegates, Sill Elevation 1610.0 (Proposed Plan). This alternative consists of 9 fuse gates founded on a broad crested weir with sill elevation at 1610.0. The total excavation quantity is 5,576,767 cubic yards spoiled at the toe of the dam's left embankment. The fuse gates would be located downstream of the current highway location and a new highway bridge would be constructed across the auxiliary channel at the existing highway alignment. This alternative meets project objectives.

F.1b - Fusegates, Sill Elevation 1610.0. This alternative consists of 9 fuse gates founded on a broad crested weir with sill elevation at 1610.0. The total excavation quantity is 5,576,767 cubic yards spoiled at an offsite location. The fuse gates would be located downstream of the current highway location and a new highway bridge would be constructed across the auxiliary channel at the existing highway alignment. This alternative does not meet the project objectives.

F.2 – Fuse Gates, Sill Elevation 1612.0. This alternative consists of 10 fuse gates founded on a broad-crested weir with sill elevation at 1612.0. The total estimated excavation quantity is 6,114,132 cubic yards spoiled at the toe of the dam's left embankment. The fuse gates would be located downstream of the current highway location and a new highway bridge would be constructed across the auxiliary channel at the existing highway alignment. This alternative meets the projects objectives.

F.3 2 – Fuse Gates, Sill Elevation 1615.0. – This alternative consists of 13 fuse gates founded on a broad crested weir with the sill elevation at 1615.0. The total estimated excavation quantity is 6,880,958 cubic yards spoiled at the toe of the dam's left embankment. The fuse gates would be located downstream of the current highway location and a new highway bridge would be constructed across the auxiliary channel at the existing highway alignment. This alternative meets the project objectives.

2.2 Proposed Plan (F.1a). The proposed plan consists of an auxiliary spillway containing 9 fusegates with a sill elevation of 1610. The excavated material from constructing the auxiliary spillway would be spoiled below the left embankment to address the seepage and seismic issues. The berm would run the length of the left embankment and extend to a maximum width of 600-ft. Highway 58A would be realigned to accommodate the new spillway alignment. This alternative is more economically feasible when compared to the other alternatives considered (figure 2-3)

2.2.1 Relevance to Key issues:

- The prairie dog town located at Riverside Park is within the alignment of the new spillway. The prairie dogs would be relocated to a nearby site.

- Access to the Coast Guard tower and grazing lease for the ODWC would be routed around the alignment for the auxiliary spillway.
- The Café located south of the dam would not be adversely affected by this alternative. It is expected that business would increase during the construction period.
- Portions of Blaine Park and the Frank Raab nature trail would be adversely impacted by implementation of this alternative. Approximately 34 acres would be removed from the recreation program for construction of the berm with it's added benefit of addressing seepage and seismic concerns.
- ODWC has a license to operate the land below the left embankment for wildlife management. One hundred and eleven acres (111) of the 695 acres they manage below the dam would be permanently impacted by construction of this alternative. The spoiled material would be reseeded with native grasses and forbs.
- Approximately 5.5 acres of wetlands would be permanently affected by disposing the spoil material along the left embankment. USACE would ensure the wetlands located adjacent to the new embankment would continue to receive a water source and continue to thrive.
- Water supply would not be interrupted
- There would be no impact to lake levels resulting from implementation of this alternative.

2.3 Alternative Considered but Eliminated from Detailed Study. The evaluation of alternatives began with a reevaluation of the Canton Dam to safely pass the PMF without breaching. Several nonstructural alternatives were considered such as draining the lake, Dam breaching, and reallocation of storage; however, these alternatives do not permit the realization of all the authorized project purposes all the time and were not carried forward for further analysis.

Several structural alternatives addressed in the final 2001 EA were considered to remedy the hydraulic deficiency of the embankment, but were not carried forward for further analysis because they either did not meet the design criteria or were not cost effective. Alternatives considered included raising the dam with and without freeboard; uncontrolled spillway; fusegated spillway; fuse plug spillway, dike 1; and fuse plug spillway, left embankment.

In the next phase of analysis, USACE initiated detailed evaluations of the interrelated hydrologic, geotechnical, and financial issues of the fuse gates and added evaluations of tainter gate alternatives. This EA evaluates those alternatives and their effects on the environment.

Figure 2-3 Project Features

3.0 EXISTING CONDITIONS, ENVIRONMENTAL CONSEQUENCES AND MITIGATION

Discussion within this chapter will present the existing conditions of the affected environment and environmental effects as it relates to the alternatives considered as well as mitigation to compensate for anticipated impacts of the proposed plan.

3.1 Location. Canton Lake is located in portions of Blaine and Dewey counties, Oklahoma. The region around Canton Lake is characterized by rolling plains through which the North Canadian River flows in an open alluvial valley in the Dog Creek Formation. The dam site is on the North Canadian River at river mile 394.3, about 2 miles north of the city of Canton in Blaine County, Oklahoma, which is about 75 miles northwest of Oklahoma City.

3.2 Climate. The environment around Canton has moderate winters and comparatively long, hot summers. The average annual temperature from 1971 – 2000 is 60 degrees Fahrenheit (F). Temperatures range from an average daytime high of 93 degrees in July to an average low of 26 degrees in January. Blaine County average annual precipitation ranges from 27 inches to 33 inches. June and September are the wettest months; sufficient rainfall is received during much of the spring through fall. Thunderstorms occur about 45 days each year. During 1950 – 2003, 39 tornados were recorded for Blaine County. (Oklahoma Climatological Survey)

3.2.1 Storms of Record and Flood History. The flood of October 1923 is the largest flood of record at the Canton dam site. Rainfall averaging 3.42 inches above Canton Dam occurred October 9-16, 1923, following a period of heavy rainfall that saturated the watershed. Peak flow was estimated at 80,000 – 90,000 cfs. The May 1951 flood was produced by rainfall which occurred May 13-18, 1951, and averaged 5.74 inches above Canton Dam. The volume of runoff at Canton Dam was 221,600 acre-feet. Since impoundment of water began at Canton Lake in 1948, the maximum experienced high water occurred on May 25, 1951, at elevation 1628.05 msl. Flood damages prevented by operation of the project through September 1999 are estimated to be $14,368,100. Flood damages prevented in Fiscal Year 1999 were $1,376,500 .

3.3 Social and Economic Conditions. This section presents the economic and social analyses conducted in evaluating dam safety measures that would be taken in order to modify the existing dam embankment at Canton Lake to adequately convey floodwaters of a 100% PMF into the North Canadian River tail-water. The proposed plan would be to construct nine fusegates at sill depth 1610, and deposit the spoil material below the left embankment. This alternative was selected as the proposed plan because it provides the most feasible option for disposal of the excavated material with the additional benefit of resolving the seepage and seismic issues. This section includes an overview of the social and economic conditions for the existing conditions beginning at Canton Dam and analyzing conditions downstream to the metropolitan area of Oklahoma City, Oklahoma. Finally, an overview of the conditions of the “with and without” project is summarized for the impact area.

3.3.1 Study Area. The study involves an analysis of several alternatives that could be implemented in order to modify the existing Canton Dam. The study also decided upon a proposed plan that would be the most feasible from an economic and engineering perspective. Canton Dam is located in Blaine County, Oklahoma. The dam is located on the North Canadian River at river mile 394.3, about two miles north of the city of Canton and 75 miles northwest of Oklahoma City. Construction of Canton Dam began in 1940 and was completed in January of 1948. The lake also extends into Blaine and Dewey Counties in Oklahoma.

3.3.2 Population. Since Canton Lake is located mainly in Blaine and Dewey counties, the population information from the U.S. Census Bureau for those areas was used. The U.S. Census Bureau estimates that the county of Blaine had a population of 11,976 and the county of Dewey had a population of 4,743 in 2000. This is a 4.2% increase in population in Blaine County from 1990 and a 17% decrease in the county of Dewey from 1990. The State of Oklahoma posted a population increase of 8.8% during that same period. The population for the counties of Blaine and Dewey and the State of Oklahoma from 1970 to 2000 is shown by decade in Table 3-1.

TABLE 3-1
AREA POPULATION
BLAINE AND DEWEY COUNTIES, OKLAHOMA
1970-2000

	1970	**1980**	**1990**	**2000**
LOCATION				
Blaine County, Oklahoma	11,794	13,443	11,470	11,976
Dewey County, Oklahoma	5,656	5,922	5,551	4,743
State of Oklahoma	2,559,463	3,025,487	3,145,585	3,450,654

http://www.census.gov/population/cencounts/ok190090.txt*(Source for Blaine and Dewey County historical population information)*

This decreased rate of growth for Blaine and Dewey Counties from 1980 to 2000 could be attributed to the relatively rapid growth in Oklahoma City in Oklahoma County where as the residents from the less densely populated counties enter the labor force, they moved to where economic growth is more prevalent. The city of Canton is the closest town to the project area. The town of Canton has a population of 602 and is located a few miles north of the project area. According to the 2000 U.S. Census, Hispanic or Latino people report 6.8% of the total population in Blaine County and 2.6% of the total population in Dewey County. 8.5% of the 2000 population for Blaine County and 4.7% of the total population for Dewey County was American Indian/Alaskan Native. The population characteristics of Blaine and Dewey Counties and the State of Oklahoma are shown in Table 3-2.

TABLE 3-2
POPULATION CHARACTERISTICS
BLAINE AND DEWEY COUNTIES, OKLAHOMA,
AND STATE OF OKLAHOMA
CENSUS 2000

Population (Race)	**Blaine County, OK**	**Dewey County, OK**	**State of Oklahoma**
White	8,802	4,310	2,624,679
Black or African American	757	7	258,532
Hispanic or Latino	822	124	177,768
American Indian	1,028	210	266,801
Other	567	92	84,830

3.3.3 Employment and Income

In 2000, there were 4,779 residents in the labor force in Blaine County and 2,194 residents in the labor force in Dewey County. Unemployment for these two counties was reported at 5.3% for Blaine County and 3.3% for Dewey County. The State of Oklahoma's unemployment rate was slightly higher than either of the two counties with a report of 5.6% unemployed during that same year. The majority of the area's employees work in educational & health services, retail trade, manufacturing, professional, and scientific and related sectors. Employment by industry for Blaine and Dewey counties is shown in tables 3-3 and 3-4.

TABLE 3-3
EMPLOYMENT BY INDUSTRY
Blaine County, 2000

Employed Persons 16 years	4,525
Agriculture, Forestry, & Fisheries	641
Construction	300
Manufacturing	560
Wholesale Trade	86
Retail Trade	433
Transportation & Warehousing & Utilities	311
Information	43
Finance, Insurance, & Real Estate	181
Professional, Scientific & Related Mgmt	154
Educational & Health Services	966
Entertainment & Recreation Services	236
Other Professional & Related Services	293
Public Administration	321

TABLE 3-4
EMPLOYMENT BY INDUSTRY
Dewey County, 2000

Employed Persons 16 years	2,121
Agriculture, Forestry, & Fisheries	515
Construction	147
Manufacturing	82
Wholesale Trade	51
Retail Trade	267
Transportation & Warehousing & Utilities	167
Information	23
Finance, Insurance, & Real Estate	124
Professional, Scientific & Related Mgmt	41
Educational & Health Services	392
Entertainment & Recreation Services	91
Other Professional & Related Services	130
Public Administration	91

The 2000 per capita income (PCI) for residents in the counties of Blaine and Dewey were $13,546 and $15,806 respectively. This compares with the $17,646 PCI for the State of Oklahoma and the $21,587 PCI for the entire United States.

3.3.4 Social Ecology

The social area is primarily residential, with a mix of industrial, commercial, and agricultural operations located near the town of Canton. As a town of approximately 602 people, Canton serves as a gateway to Canton Lake recreational opportunities. Because the nearest metropolitan area, Oklahoma City, Oklahoma, is located 75 miles northwest of the project area, employment and business development in Oklahoma City would be impacted directly by the stability of the dam and surrounding project area.

3.3.5 Environmental Impacts of the No Action alternative;

3.3.5.1 Description of Population at Risk. Downstream of Canton Dam are a number of communities that would be affected if the Dam were to fail. Population at Risk (PAR) is defined as those people who potentially may be injured or killed by a given flood event. It includes people who reside, work, or conduct other activities in an area that can be flooded under certain meteorological and hydrologic conditions. In this analysis, it includes the population in the 100% probable maximum floodplain area (PMF), under a dam breach scenario.

3.3.5.2 Determination of PAR. For this analysis, the PAR was estimated using 2000 U.S. Bureau of Census population data, and information included in the Corps of Engineers Canton *Dam Safety Assurance Program Evaluation Report* (March 2001). People often work in areas away from where they live, particularly those persons living adjacent to metropolitan areas. Information on business establishments in the floodplain was gathered from the Canton Dam Safety Report. The floodplain is popular for recreation use as reflected by the visitation data for the Federal recreation facilities

downstream of Canton Lake Dam. Corps of Engineers visitation data was used to estimate the recreation persons at risk for areas downstream of the dam. Visitation numbers averaged from 2000-2005 were approximately around 940,000 visitors to Canton per year. Four general categories of people are potentially at risk downstream during flood conditions: (1) residents, (2) workers, (3) travelers (in-transient population), and (4) recreation users. The threat to each group is unique.

3.3.5.2.1 Residents. For residents who reside immediately downstream of the dam extending into the town of Canton, the threat from flooding is most acute. While most of the area is rural, the town of Canton, Oklahoma population 602, is located within a mile of the dam. Water flows would be deep and high in velocity (particularly under dam breach scenarios). Beyond the town of Canton, the area stretching past Watonga Lake is primarily rural, with scattered residences similar to other rural areas in reaches along the North Canadian River. The town of Watonga, Oklahoma population 4,674 is on the west bank of the North Canadian River. Residences in this area would also be threatened by flooding, but not to the degree of the people living in the upstream from here. The town of Greenfield, population 102, is located downstream of Watonga. Further downstream is the town of Calumet, population 572. The North Canadian River flows directly through the city of El Reno and is also downstream of Canton Lake, has a population 16,274. The city of Yukon, an Oklahoma City suburb, with a population of 21,178, is located along the North Canadian River as well. The suburbs of Bethany, population 20,459, and Warr Acres, population 9,742 are also located in the area. The North Canadian River also transects Oklahoma City, population 505,963.

3.3.5.2.2 Workers. As with the communities and rural areas that exist directly below Canton Dam (the town of Canton), workers in this area would be most acutely threatened. Most of those living in residences located immediately below the dam work in the area. From Watonga to Oklahoma City, the threat to workers would be less acute because floodwaters would be slower to rise and the flows would be less intense. Having a concentration of economic activity similar to communities in and around Oklahoma City, would have more workers leaving the area for work than entering the area for employment. The rise and flow of floodwater would be least intense for those working Oklahoma City and the surrounding suburbs. Because these communities are centers for economic activity, the daytime and nighttime persons at risk variation are assumed to be minimal. The number of residents employed outside of Oklahoma City and surrounding communities is estimated to be equal to the number of people entering the potential flood area to work.

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3.3.5.2.3 Travelers (In-Transient Population). A major freight rail line runs through the town of Canton. Although no passenger service uses this line, floodwater would jeopardize the lives of any freight train crews. A major rail line services the Oklahoma City metropolitan area. The line runs along the North Canadian River, in El Reno and Oklahoma City area.

State Highways 51 and 58 traverse areas within the reach that would be flooded under a dam breach condition. The State of Oklahoma estimates the average daily traffic volume

at the intersection of these highways to be 3,000 vehicles, which would be 4,500 drivers and passengers. Potential flooding would inundate people using this automobile traffic way. Another major rail line crosses the North Canadian River upstream of Watonga. State Highway 33 crosses the North Canadian River near Watonga, with a daily average traffic volume of approximately 5,800 vehicles. U.S. Highway 270/281 intersects the North Canadian around the town of Greenfield with an average traffic count of 3,200 vehicles per day. U.S. Highway 270 is the major traffic way through areas in and within close proximity to Calumet. Numerous traffic ways intersect and run along the North Canadian in areas from El Reno to Oklahoma City. U.S. Highway 81 intersects the North Canadian River in El Reno, with a traffic count of 13,000. State Highway 4 crosses near Yukon, with a 13,800 average daily traffic count. Interstate 40 follows the dam breach floodplain through Yukon into Oklahoma City. The average traffic count on the major thoroughfare through Oklahoma City is 195,000. Interstates 44 and 35 intersect the North Canadian River in Oklahoma City as well. Based on State estimates, approximately 234,000 vehicles travel through the dam breach floodplain each day. Vehicular traffic historically has been at great risk by flooding in this area, as in many areas of the United States. Often flooding kills or injures people in automobiles as vehicles are driven into or are swept away by floodwaters. Even with warnings, rerouting of traffic would increase traffic in areas not accustomed to heavy traffic, therefore increasing the chance of automobile and truck accidents.

3.3.5.2.4 Recreation Area Users. Potential flooding would threaten those recreating more than workers and residents located in the town of Canton. Two recreation areas with 16 campsites are located immediately below Canton Dam. Individuals using these areas would be most directly exposed to the dangers of deep, high velocity floodwaters and least exposed to systematic methods of warning (telephone and electronic media). Persons recreating in other areas would be less acutely threatened than by those recreating upstream closer to the dam. Floodwaters would rise at a slower rate and a slower velocity flow than in areas downstream of Canton but upstream of Watonga. Most of the lands in areas near Watonga, Greenfield, Calumet, El Reno, and Yukon are private lands and have no recreation facilities. The largest recreation area in the dam breach floodplain, Lake Overholser, is located in near Oklahoma City. Those recreating in any of those areas would be threatened under flood events with a dam failure.

3.3.5.3 Evacuation and Warning Difficulties. Problems would occur if communication and transportation links were severed. Heavy rains or river flows may destroy roads, bridges, and electrical and telephone lines, consequently making normal communication and transportation channels unusable. Emergency water releases could hamper evacuation and notification operations if too great a flow were released. Sentimental attachment to homes, skepticism about the reality of danger, isolation from mass media and neighbors, and other factors contribute to people not taking action when warned about flooding from Canton Dam.

3.3.5.3.1 Warning Times. The time available to warn persons at risk in each reach prior to the arrival of a flood wave is critical to reducing the loss of life and injury from a rare event flood. The warning of dam failure would allow public officials and others to make

populations aware of threatening situation or potential dam failure condition until the flood wave reaches each person at risk. It is assumed that project personnel are at the dam monitoring the weather and river stages as well as runoff forecast. Even without a warning of dam failure, officials would have time to warn populations farther down the stream about the flooding threat.

3.3.6 Environmental Impacts of the Proposed Plan alternative:

3.3.6.1 Population. The proposed alternative to repair Canton Dam would have a direct impact on people living and working downstream and in the floodplain of Canton Dam. Population trends of the past decade would continue although at higher rates of growth as more residents would likely move to the nearby metropolitan area of Oklahoma City. Construction of the auxiliary spillway would temporarily increase noise and traffic, which would affect those commuting across the Dam. Traffic congestion would be expected to increase as a result of traffic diversions. The construction may adversely impact some recreational visitors who enjoy camping at the Canadian public use area due to periodic increases in noise.

3.3.6.2 Employment. The project construction may slightly increase job opportunities in the area until construction is complete. Long-term employment would not directly impact the area near Canton Dam, although it would increase downstream as the economy of Oklahoma City keeps growing and people feel re-assured that they are safe from Canton Dam breaching.

3.3.6.3 Income. Long-term growth in income downstream of Canton Dam would be realized as construction of residential and commercial property is initiated in response to reduced flood hazards. Additionally, as increased population growth in the area occurs, more residents would recreate at Canton Lake, thereby increasing the income of businesses that provide recreation related services.

3.3.6.4 Social Ecology. Although land use around Canton Dam would continue to be used for activities pertaining to recreation, development of more commercial sites may occur in the absence of flood hazard and the increase in recreation. As well, a mixture of low, moderate, and high-income residential properties may increase for the areas and communities downstream of Canton Dam as more people continue to move to the larger metropolitan area of Oklahoma City.

3.3.7 Environmental Justice. Executive Order 12898 requires that Federal agencies address the environmental impacts of their actions on minority and low-income populations. The Executive Order requires that Federal agencies address how its actions would result in health and environmental effects that are disproportionately high for such populations. Executive Order 13045 requires that Federal agencies identify and assess health risks and safety risks associated with its action that may disproportionately affect children.

According to the 2000 U.S. Bureau of Census, poverty in Blaine County decreased by 21.9 percent between 1990 and 2000. In 1990 there were 2,241 individuals living below the poverty level. This number decreased to 1,751 by 2000. Poverty in households headed by single women with children under 18 yeas was 126 in 1990. In 2000, this number decreased by 37.3 percent to 79 for these same households. When comparing county demographics between 1990 and 2000, the Asian population had the greatest increase in Blaine County from 18 in 1990 to 85 in 2000, a 372 percent increase. The Hispanic/Latino population increased 176 percent followed by a 60 percent increase in the African American population and a 5 percent increase in the Native American population.

3.3.7.1 Environmental Impacts of the No Action alternative. Impacts to minority and low-income populations are no greater than impacts to other populations. The action does not substantially affect the health risks and safety risks to children.

3.3.7.2 Environmental Impacts of the Proposed Plan alternative: There are no greater appreciable impacts to minority and low-income populations than impacts to other populations. The action does not substantially affect the health risks and safety risks to children

3.4 Natural Resources. The USACE coordinated with the USFWS and ODWC concerning the proposed project. Both agencies provided input on the potential impacts of the proposed plan and recommendations for mitigation. The USFWS coordination report is located in Appendix D.

3.4.1 Ecoregion. The project area is located within Ecoregion 311, the Great Plains steppe and shrub province as explained by Robert Bailey, USDA. Most of this region is characterized by irregular plains with a relief of less than 300 ft. Elevations range from 1,600 ft to 3,000 ft, increasing gradually from east to west. On these dissected plains, the broad divides range from nearly level to gently sloping, but slopes are short and steep in the valleys (Bailey, 1995)

3.4.2 Soil Types. The soil association found within the proposed project area is the Canadian –Port-Lincoln, a deep well-drained loamy and sandy, nearly level soil of the floodplain and the Dill-Minco-Nobscot Association, a moderately deep to deep, loamy and sandy soil of very gently sloping to steep uplands (USDA).

3.4.2.1 Prime and Unique Farmland. Blaine County has 37 soils classified as prime farmland (USDA 1983) of which the Canadian, Dill, Port and Wann loams are considered prime farmland. The Canadian and Wann series occur below the existing left embankment. The Oklahoma Department of Wildlife Conservation (ODWC) manages approximately 695 acres below the embankment as part of the Canton Wildlife Management Area. Approximately 96 acres are managed as share crop fields and 42 acres are planted for wildlife. Crops planted include millet, cowpeas, winter wheat, maize, alfalfa and sunflower. The Dill soils occur along the right abutment just upstream

of the dam. This area is used for recreation with an outdoor amphitheater located in the immediate area.

3.4.2.2 Environmental Impacts of the No Action alternative: The current land-use is expected to continue under the future without project alternative. The Oklahoma Department of Wildlife Conservation would continue to manage the lands below the dam for wildlife management and lease portions of the area for farming. It is not anticipated that additional lands would be converted to farming nor is it anticipated that currently farmed lands would be abandoned.

3.4.2.3 Environmental Impacts of the Proposed Plan alternative: Under the proposed plan, approximately 20 acres below the left embankment that are farmed would be permanently affected by implementing the proposed plan. Excavated material from the construction of the auxiliary spillway would be spoiled along the length of the left embankment adversely impacting lands currently leased to ODWC and utilized for food plots and share cropping. The impacts to prime and unique farmlands are considered minimal because the lands were designated for project purposes when the lake and dam were constructed and removed from farming at that time.

Approximately 5,580,000 cubic yards of material would be excavated for construction of the auxiliary spillway and spoiled along the left embankment. Best management practices would be implemented to control soil erosion and prevent sediment from entering the waterways. All disturbed areas would be reseeded and sediment control practices would remain in place until vegetation was reestablished.

3.4.2.4 Cumulative Effects.

Past Actions. According to the 1997 Census of Agriculture, Blaine County had 841 farms, averaging 650 acres. Agriculture production was divided between livestock (77 percent) and crops (23 percent). Compared to the 1992 Census of Agriculture the average farm size increased 4 percent. However, the number of farms decreased from 949 in 1982 to 841 in 1997.

Present Actions. Past trends are expected to continue. It is expected that the size and numbers of farms would vary slightly from year to year but losses of farmland are anticipated to be minimal in Blaine County.

Future Actions. Blaine County is not expected to experience great economic growth in the future that would involve converting large tracts of farmland to urban development. The impacts of this federal action when considering cumulative effects would be negligible.

3.4.3 Terrestrial Habitat. The vegetation below the left embankment consists of a mix of post oak and black-jack oak. There are several mature cottonwood trees ranging between 20 to 45 dbh (diameter at breast height). Eastern red cedar trees are quickly colonizing the area. The understory is a mixture of dogwoods, elderberry, greenbriar and native grasses.

Vegetation within Riverside Park is predominantly grasses that are regularly mowed throughout the growing season. The prairie dog town is located in this area and there are numerous burrows located throughout the area. Thirty-two acres of Riverside Park would be adversely impacted by construction of the auxiliary spillway.

The vegetation within the realignment of the highway is predominantly blackjack and post oak. The areas are managed for project purposes and the grasses are mowed regularly. Realigning highway 58A would impact approximately 17.5 acres of federal property zoned for project purposes.

3.4.3.1 Environmental Impacts of the No Action alternative: The terrestrial habitat below the dam is expected to continue to develop into a mature forest. The ODWC would continue to manage the lands for wildlife management. Without intensive management the red cedar would continue to invade the area and eventually become the dominant woody species. The lands along the right abutment would continue to be maintained and mowed for project purposes and utilized for recreation.

3.4.3.2 Environmental Impacts of the Proposed Plan alternative: The auxiliary spillway alignment would adversely impact approximately 32 acres of grass field that is maintained as a recreation area. The spoil berm alignment would adversely impact approximately 145 acres of terrestrial habitat. The habitat is considered medium quality and based on professional judgment would rate .6 on a scale ranging from 0 – 1 if utilizing the USFWS Habitat Evaluation Procedures. Of the 145 acres impacted, 34 acres are utilized for recreation and 111 acres are managed by ODWC for wildlife. Within the 111 acres, 20 acres are croplands and 5.5 acres are wetlands.

To offset the losses resulting from construction of the proposed plan, the USACE plans to purchase approximately 20 acres of private property on the southwest side of Canton Lake that is adjacent to federal owned property managed by ODWC. Additional funds would be furnished to ODWC to implement wildlife management practices around Canton Lake such as invasive species control, restoration of native prairie or bottomland hardwoods and wetlands. The exact funds provided to ODWC would be based on the value of the land impacted minus other environmental improvements implemented by USACE as mitigation for implementation of the proposed plan.

3.4.3.3 Cumulative Effects.

Past Actions. Impoundment of Canton Reservoir covered 13,000 acres of terrestrial habitat. The area consisted of flat valley lands with rolling hills. The lower valley area was predominantly grass or small bushes, while the higher ground was mostly farmland. Forested land along the North Canadian River riparian corridor in central Oklahoma decreased 71% in 1941 from what was present in 1872 and another 27% from 1941 to 1991 (Farley; Masters; Engle, 2002). Approximately 98% of the 1872 rangeland was replaced by other land uses, mostly agriculture (Farley, Masters, Engle, 2002).

Present Actions. Lands surrounding Canton Lake are managed for wildlife by ODWC. The community remains predominantly rural with a large agricultural presence.

Future Actions. USACE has no plans for development on Canton Lake in the future. ODWC would continue to manage the lands for wildlife. Prescribed burns and invasive species control would continue. The impacts of this federal action when considering cumulative effects would have no appreciable impact.

3.4.4 Aquatic and Wetland Habitat. Canton Lake provides a diverse and vital aquatic habitat. At top of conservation pool, the lake contains 97,900 acre-feet of water with a surface area of 7,900 acres. First impounded in April 1948, Canton Lake is managed by the ODWC as a major game fisheries resource.

According to the USFWS National Wetland Inventory maps, several wetlands are located within the footprint of the proposed project (figure 3-5). There are eight wetlands occurring below the left embankment and two located within the new auxiliary spillway that is within the project footprint. Many of these wetlands result from the water seeping through the left embankment. Approximately 5.5 acres of wetlands located below the left embankment and 3.7 acres located within the proposed auxiliary spillway alignment would be negatively impacted. The project was coordinated with the USACE Regulatory Office to determine whether jurisdictional wetlands would be impacted by the proposed plan. They determined that the wetlands were isolated and were not jurisdictional; therefore a section 404 permit would not be required pursuant to the Clean Water Act (Appendix C).

Wetland descriptions and the areas impacted are listed below:

PFO1Ah: Palustrine, Forested, Broad-leave deciduous, temporarily flooded, diked/impounded. (Cowardin, 1979). Diked/impounded is defined as created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water. These areas were created from the drainage from the relief wells constructed below the left embankment. These wetlands are wet most of the year. Woody vegetation consists of willows and cottonwoods. Approximately 1.9 acres would be adversely impacted by construction of the berm (Area 7, 8, 9) to address seepage and seismic issues.

PFO1A: Palustrine, Forested, Broad-leaved deciduous, temporarily flooded. Wetland Area 1 falls into this classification. Area 1 consists of a drainage ditch that is heavily vegetated along the banks of the drainage ditch. There was no water at the time of the field survey conducted on October 19, 2006. Vegetation adjacent to the ditch consists primarily of red cedar, cottonwoods and oaks. The area outside of the ditch consists of grass that is regularly mowed. Approximately 3.4 acres is within the foot print of the project (Area 1).

PFO1C: Palustrine, Forested, Broad-leaved deciduous, seasonally flooded. Forested wetlands are characterized by woody vegetation that is 20-feet or taller. Seasonally flooded means surface is present for extended periods especially early in the

growing season, but is absent by the end of the growing season in most years. Wetland Area 6 falls into this classification. Plant species occurring here include buttonbush, box elder, dogwood, willows, goldenrod, winterberry, sedges, balloon vine and cattails. There was a considerable amount of water in the wetland given the drought conditions over the past several years. There are several snags and fallen timber. The quality of the wetland is considered slightly above average based on plant diversity, variability of structure and wildlife observed. Approximately .9 acres is within the foot print of the proposed berm (Area 6)

PSS1C: Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded. Scrub-shrub includes areas dominated by woody vegetation less than 20 feet tall. Species include tree shrubs, saplings and trees and shrubs that are small. Plant species occurring in this wetland were predominately cattails and based on professional judgment the quality was considered low. Approximately .7 of an acre would be impacted by the berm (Area 5).

PEM1C: Palustrine, emergent, persistent, seasonally-flooded. Emergent wetlands are characterized by species that normally remain standing at least until the beginning of the next growing season. Approximately 1.9 acres is within the footprint of the berm (Area 3 and 4)

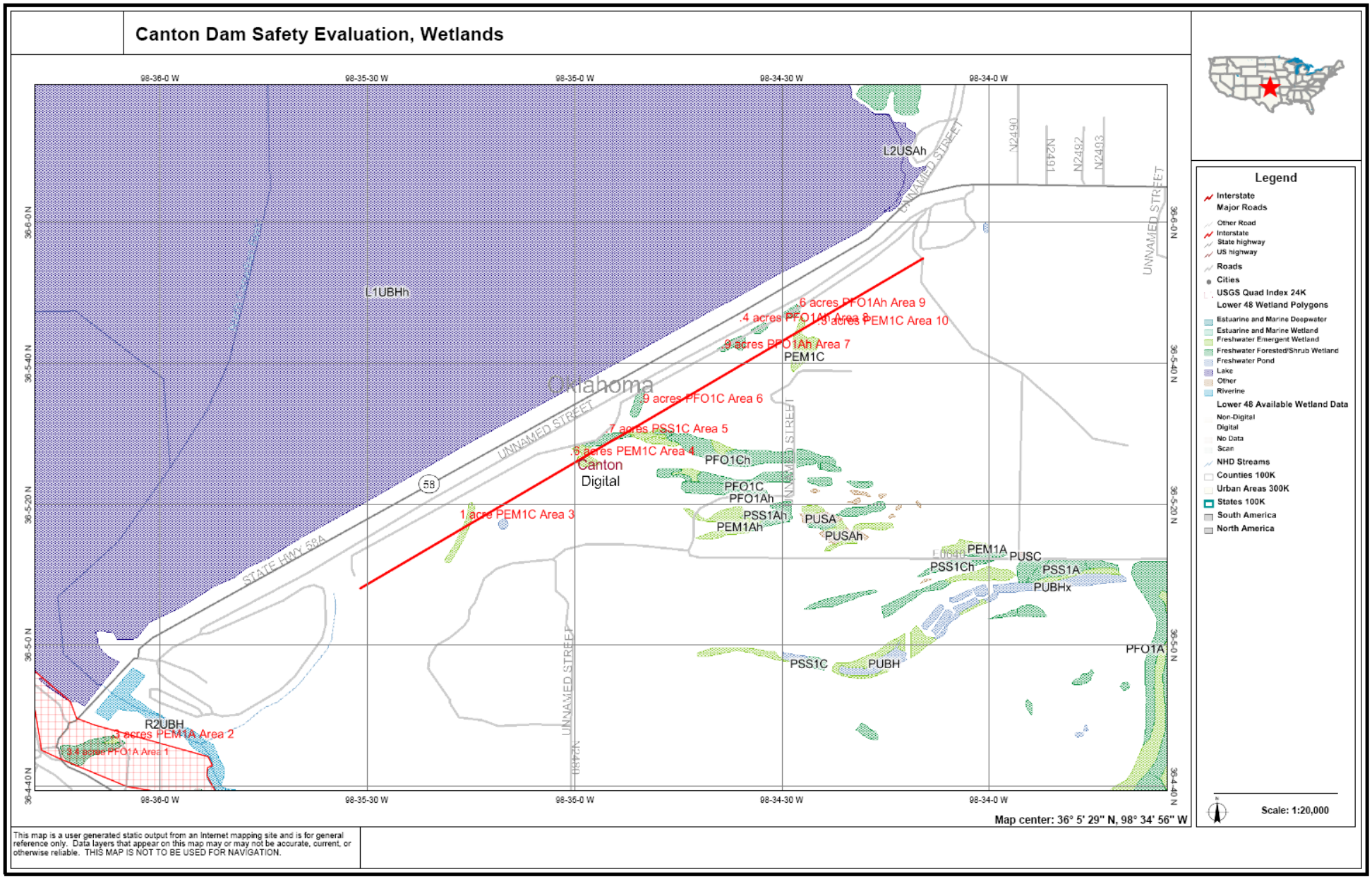
PEM1A: Palustrine, emergent, persistent, temporarily flooded. This wetland is a ditch and was dry at the time of the site visit on October 19, 2006. Approximately .3 acres is adversely impacted by construction of the auxiliary spillway (Area 2).

3.4.4.1 Environmental Impacts of the No Action alternative: The wetland habitat below the dam would continue to mature and develop. Many of the wetlands would be dominated by cattails if a control program were not implemented.

3.4.4.2 Environmental Impacts of the Proposed Plan alternative: There are ten wetlands located within the foot print of the project that would be adversely impacted. Eight of the wetlands are located below the left embankment and would be permanently impacted by spoiling the excavated material below the left embankment. Approximately 5.5 acres comprised of wetland areas 3 through 10 would be covered by the spoil material and no longer function as wetlands. However, a majority of these wetlands are considered low-quality wetlands. All the wetland areas except area 6 are considered low quality wetlands based on professional judgment. Wetland area 5 is completely overrun by cattails. Wetland area 6 containing approximately 1.0 acre is considered an above average quality wetland providing habitat diversity and structure for wildlife.

The lake level would not be dropped as a result of implementation of the proposed plan. Turbidity levels in the water in the immediate vicinity of the work may increase slightly when the “earthen plug” is removed after the fuse plug spillway is constructed. This is anticipated to be short term and have little adverse impact on the fisheries in the lake.

Canton Dam Safety Evaluation, Wetlands



This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

3.4.4.3 Cumulative Effects.

Past Actions. Construction of Canton Dam and impoundment of the lake flooded wetlands in the area and converted a riverine system into a lacustrine system. Seepage below the left embankment has resulted in creation of some wetlands below the embankment near the relief wells and drainage channel. In the past, it was a common practice by farmers to drain wetlands to plant crops. From 1977 to present, the USACE regulatory office conducted 90 Section 404 reviews in Blaine County. Many of these reviews resulted in permits being issued, either individual permits or nationwide permits. Activities requiring a permit range from housing developments to utility line construction to road construction.

Present Actions. The lands adjacent to Canton Lake are managed for wildlife by ODWC. Wetlands are protected and when possible improved by removing noxious weeds and invasive species. Through the USACE regulatory program, environmental impacts on aquatic resources are avoided, minimized and lastly mitigated. USACE is dedicated to protecting the nation's aquatic resources while allowing reasonable and necessary development to go forward. Nationally, more than 60,000 acres of wetlands are restored, created, enhanced or preserved by USACE every year. (www.vtn.iwr.usace.army.mil).

Future Actions. Wetlands and aquatic resources would continue to be regulated by the USACE regulatory program with every attempt to avoid, minimize and lastly mitigate for environmental impact to these resources. The wetlands remaining below the spoil berm once it is constructed would be provided a water source to ensure their continued viability. Actions proposed by ODWC would be monitored to ensure there were no adverse impacts to wetlands and opportunities would be sought to restore and enhance existing wetlands adjacent to Canton Lake. The impacts of this federal action when considering cumulative effects would be minimal.

3.4.5 Wildlife

Mammals: Mammals most likely to occur in the area include white-tailed deer; eastern fox and gray squirrel; thirteen-lined ground squirrel, plains pocket gopher; eastern cottontail, blacktail jackrabbits, prairie dog, American beaver; bobcat; common gray fox; coyote; nine banded armadillo; common raccoon; striped and eastern spotted skunk; Virginia opossum, Eastern Pipistrelle and numerous bats and rodents.

U.S. Fish and Wildlife

Along hwy 58A in Riverside Park there is a 6 acre black-tailed prairie dog town. The prairie dog town is a popular attraction for the visitors of Canton Lake, OK. The black-tailed prairie dog lives in burrows. The burrow entrance leads to a tunnel that can be as deep at fifteen feet and then straightens out to a horizontal tunnel that runs ten to fifteen feet (USFWS). Prairie dogs have an intricate social system composed of one male, several females and their offspring. Prairie dog

populations vary from 5 to 35 per acre. It is estimated that the prairie dog town at Canton is contains approximately 120 prairie dogs.

Amphibians and Reptiles: Recorded sightings of reptiles in Blaine County and that could be present in the project area include: Red-eared Slider, common snapping turtle (Chelydra serpentine), ornate box turtle (Terrapene ornate), yellow mud turtle (Kinosternon flavescens), prairie lined racerunner lizard Texas horned lizard (phrynosoma cornutum), collared lizard (Crotaphytus collaris), bull snake (Pituophis melanoleucus), western diamondback rattlesnake (Crotalus atrox), plains garter snake (Thamnophis radix), black rat snake (Elaphe obsolete), coachwhip (Masticophis flagellum), milk snake (Lampropeltis triangulum), ring-necked snake (Diadophis Punctatus), rough green snake (opheodrys aestivus).

Fish: Canton Lake provides fishing for several species of sport fishes. The walleye population has spawned naturally in the lake since 1965 and is a major source of walleyes and saugeye stockings in Oklahoma. Major native spot fish present in the lake are largemouth bass, hybrid bass, crappie, white bass, channel catfish. Other common species found in the lake include carp, river carpsucker, freshwater drum, black bullhead, gizzard shad, logperch, buffalo spotted gar, Mississippi silverside, and various species of sunfish and minnows. Macroinvertebrates that are common to lake habitat include insects, mussels, snails and aquatic worms.

Birds: Principal game birds are the bob white quail, dove, ringneck pheasant, and wild turkey. Other birds observed in the area include great blue heron, turkey vulture, swainson's hawk, American coot, morning dove, barn owl, osprey, marsh hawk, common nighthawk, downy woodpecker, northern flicker, cliff swallow, barn swallow, American crow, American robin, European starling, northern cardinal, American tree sparrow, vesper sparrow, lark sparrow, Harris sparrow, red-winged blackbird, eastern meadowlark, western meadowlark, common grackle and American goldfinch.

Waterfowl common to the area include: Canada and snow geese, wood ducks, mallards, northern pintail, blue-winged and green-winged teal, gadwall, coots, grebes, common and hooded merganser, northern shoveler, American black ducks, cormorant, little blue and great blue heron and egrets. Other species viewed in the area but not as common are red-breasted merganser, pelicans, and gulls.

3.4.5.1 Environmental Impacts of the No Action alternative: Under the no action alternative, wildlife would continue to thrive and utilize the area. ODWC would continue to manage the lands below the left embankment for wildlife management and current trends would be expected to continue. The prairie dog town would continue to thrive and expand their town to suitable habitat in the area.

3.4.5.2 Environmental Impacts of the Proposed Plan alternative: Approximately 194.5 acres would be adversely impacted by implementing the proposed plan. Thirty-two acres of federal property currently utilized for recreation at Riverside Park are within the alignment for the new auxiliary spillway; 17.5 acres of project lands would be impacted

by realignment of highway 58A; 34 acres at Blaine's Park utilized for recreation and 111 acres licensed to ODWC for wildlife management below the left embankment would be impacted by construction of the spoil berm. Wildlife utilizing the area would relocate to areas immediately adjacent to the project area. Some losses of amphibians and reptiles utilizing the wetland areas are anticipated

The ODWC manages approximately 14,917 acres of property around Canton Lake for Wildlife Management of which 695 acres are located below the dam. The loss of approximately 111 acres amounts to 16% of the property they manage below the dam but less than 1% of the lands they manage for wildlife at Canton Lake.

To offset the losses resulting from construction of the proposed plan, the USACE plans to purchase approximately 20 acres of private property on the southwest side of Canton Lake that is adjacent to federal property to be managed by ODWC for wildlife management. Additional funds would be furnished to ODWC to implement wildlife management practices around Canton Lake such as invasive species control, restoration of native prairie or bottomland hardwoods and wetlands. The exact funds provided to ODWC would be based on the value of the land impacted minus other environmental improvements implemented by USACE as mitigation for implementation of the proposed plan. The prairie dog town would be relocated to a site near their existing town. .

3.4.5.3 Cumulative Effects.

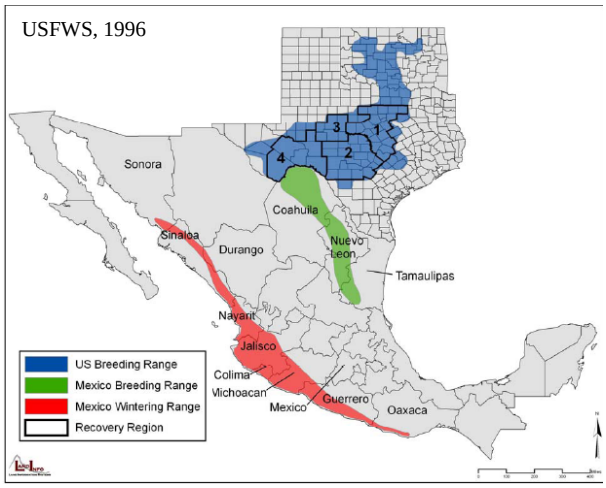
Past Actions. Construction of Canton Dam and impoundment of the lake negatively impacted wildlife in the area by flooding their habitat. Losses of their habitat were offset by designating 14,917 acres for wildlife management and licensed to ODWC. New habitat was created for aquatics and a viable walleye fisheries program was established.

Present Actions. Approximately 14,917 acres surrounding Canton Lake are managed for wildlife by ODWC. Management activities include controlled burning approximately 1500 acres annually and prescribed grazing on approximately 5,200 acres for native grass and forbs management. Approximately 1,200 acres are leased annually for farming and planting food plots. ODWC has also installed approximately 18 windmills and solar water pumps to provide year-around water supply for wildlife. ODWC utilizes Canton Lake for walleye and hybrid stripped bass stock for other lakes in Oklahoma. As part of their aquatic management, ODWC installs brush piles to provide habitat for fisheries.

Future Actions. ODWC would continue to manage wildlife around Canton Lake. They have plans to create a wetland and would continue to perform controlled burns, lease land for grazing and farming and manage the fisheries on the lake. USACE would acquire 20 acres for wildlife management adjacent to currently managed ODWC lands and provide funds to ODWC to perform additional wildlife management activities on Canton Lake to compensate for lands lost for the berm to address seepage and seismic issues.

3.4.6 Threatened and Endangered Species. Correspondence with the U.S. Fish and Wildlife Service (USFWS) and the Oklahoma Department of Wildlife Conservation (ODWC) included request for information and a database search to establish presence of Federally-listed threatened and endangered species and stated listed species that may occur in Blaine County, OK. According to the USFWS website there are seven federally listed threatened and endangered species that may occur in Blaine County. In addition to the federally listed species there are seven state listed threatened and endangered species. See Table 3-5 for a full listing of species and status

Bald Eagle (*Haliaeetus leucocephalus*). The Bald Eagle is federally and state listed as threatened in Oklahoma and has been proposed for delisting. The bald eagle's preferred habitat is coastal areas, rivers or lakeshores with large, tall trees. The bald eagle is a winter visitor that is frequently seen at Canton Lake and can be viewed from November through March with the peak months being December through February. A bald eagle count is conducted each year in conjunction with the national mid winter survey which is generally conducted during the 1st two weeks in January. The average counts range from 20-25 birds in a good year and 10-15 birds in a bad year. Bald eagles can be viewed early mornings feeding around Canton dam or out over the main body of the lake. They prefer to roost in the heavy timber along the north shoreline and the upper west end of the lake near the mouth of the North Canadian River and in remote areas behind the islands. Bald Eagles have been seen in the cottonwoods along the toe of the left embankment. Bald eagle nesting activity has increased dramatically in Oklahoma in recent years; however, no nesting pairs have been reported on Canton Lake. There are approximately 27 bald eagle breeding pairs in Oklahoma.



Black-capped vireo (*Vireo atricapilla*). The black-capped vireo is federally and state listed as endangered. Their preferred habitat is oak scrubland in various stages of succession (Graber 1961). Plant species within the vireo's range generally consists of blackjack oak, shin oak, Spanish oak, plateau live oak and vasey oak. In Oklahoma, recent breeding of the black-capped vireo was documented only in portions of Wichita Mountains and in Blaine and Cleveland Counties (The Birds of North American website). The birds can be seen migrating during the fall from late August through mid to late September and in the spring from mid to late April in Oklahoma (Graber 1961). There have not been any studies conducted to determine if the Black-capped vireo is within the study area, but conversation with local wildlife personnel and USACE staff indicate they are not in the area.

Interior Least Tern (Sterna albifrons). The interior least tern is federally and state listed as endangered in Oklahoma. They may be seen in the area around Canton Lake during migration. There is no appropriate habitat for these species within the project area

Piping plover (*Charadrius melodus*). The piping plover is federally and state listed as threatened in Oklahoma. There is no habitat in the project area for the piping plover and the plover has not been seen in the area.

Whooping Crane (*Grus Americana).* The whooping crane is federally and stated listed as endangered in Oklahoma. They may be seen migrating through west central Oklahoma during the fall migration from September to October and spring from March through April.

Table 3-5 Threatened and Endangered Species List

Common Name	Scientific Name	Federal Status	State Status
Bald Eagle	*Haliaeetus leucocephalus*	T/PDL	NL
Black-capped vireo	*Vireo atricapilla*	E	E
Interior least tern	*Sterna antillarum athalassos*	E	E
Piping plover	*Charadrius melodus*	T	NL
Whooping crane	*Grus americana*	E	NL
Prairie Falcon	*Falco mexicanus*	*	SS1
Burrowing Owl	*Athene cunicularia*	*	SS2
Arkansas River shiner	*Notropis girardi*	T, critical habitat designated	T
Prairie Mole Cricket	*Gryllotalpa major*	*	SS2
Texas horned lizard	*Phrynosoma cornutum*	*	CS SS2

T–Threatened E–Endangered PDL-Potential Delisting NL-not on state list
SS1- State species of concern – species is vulnerable to extirpation
SS2-State species of concern; possibly threatened or extirpated but additional info is needed.
CS-Statewide closed season; unlawful to possess or to kill individuals or to remove from habitat
*Not listed by USFWS as a threatened or endangered species

3.4.6.1 Environmental Impacts of the No Action alternative. There would be no adverse impacts to threatened and endangered species resulting from no action. Bald Eagles would continue to utilize the area. There is a potential that they could start nesting along the lake in the future.

3.4.6.2 Environmental Impacts of the Proposed Plan alternative. The proposed plan would impact approximately 165 acres below the left embankment for construction of the spoil berm. There are several mature cottonwood trees located in this area that are utilized by bald eagles during their winter migration; however, the removal of these trees is not expected to impact the bald eagles since additional cottonwood trees are located outside the project area for their use. To offset the losses of this habitat to the bald eagle, USACE would construct two bald eagle roosting platforms on the lake at a location

designated by USFWS. None of the other threatened and endangered species would be impacted by implementation of this alternative

3.4.6.3 Cumulative Effects.

Past Actions. The Endangered Species Act (ESA) was passed in 1973. It provides for the designation and protection of fish, wildlife and plant species in danger of becoming extinct and conserves the habitat that they depend on. Past actions that have affected fish and wildlife include removal or fragmentation of their habitat and over hunting, herbicide and pesticide applications. The bald eagle was one of the first species listed on the ESA. One hundred thousand bald eagles once inhabited the United States, but in the 1970s only a few hundred nesting pairs could be found (Defenders of Wildlife).

At the time of listing, Black-Capped Vireo's total known population across their breeding range was approximately 350 adult birds, including 191 breeding pairs (Marshal et al, 1985). These numbers comprised 45-50 adults representing about 12 breeding pairs from four counties in Oklahoma. From 1990 – 1995, a county to county records research yielded a total count of 1803 males within their breeding range of which 170 males were from three counties in Oklahoma (USFWS 1996).

Present Actions. The Endangered Species Act (ESA) and the Fish and Wildlife Coordination Act (FWCA) are major federal statutes designed to protect plant and animal resources from adverse effects due to development projects. Both of these acts require consultation with wildlife authorities before committing resources to projects. A few species such as the Bald Eagle have recovered tremendously from protection and are now being considered for delisting from the threatened and endangered species list. Currently, there are more than 6,000 nesting pairs of bald eagles in the United States. The USFWS has issued guidelines on how the bald eagle should be protected by landowners and others. The USFWS has proposed nesting management guidelines and provided a regulatory definition of "disturb" to help landowners and others understand how they can help protect bald eagles consistent with existing laws (USFWS). The public comment period concerning the proposed delisting closed May 17, 2006.

For present status of Black-capped vireo's from 1996-2005, compilation of a dataset of observations recorded yielded a total count of 6,269 breeding males of which 2,495 were observed from three counties in Oklahoma

Future Actions. The USACE would continue to adhere to the ESA and review proposed actions to ensure there are no adverse impacts to listed species. The USACE will work with ODWC to seek opportunities to restore habitat for listed species occurring at Canton Lake. Once the bald eagle is removed from the threatened and endangered species list it would still be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The impacts of this federal action when considering cumulative effects would have no appreciable impact.

3.5 Cultural Resources. Archaeological sites representative of the Paleo-Indian through Late Archaic, Woodland, Late Prehistoric, and Historic Periods are known from

the immediate vicinity of Canton Lake. This culture-historical sequence falls generally within the overall sequence that has been established for northwest Oklahoma. Many sites in this area have undisturbed, deeply-buried deposits; many are comprised of multi-component prehistoric and/or historic occupations.

In order to comply with the requirements of Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) and its implementing regulation 36 CFR Part 800, Tulsa District conducted cultural resources investigations during the period 2004-2006 within the vicinity of the dam and the planned location of the improved spillway. Copies of reports of these investigations are included in Appendix B.

Tulsa District initiated Section 106 consultation with the Oklahoma State Historic Preservation Office (SHPO) and the Oklahoma Archeological Survey (OAS) in 2001 (see correspondence in Appendix B). During this coordination, Tulsa District determined that the Canton Lake dam is eligible for the National Register of Historic Places (NRHP) under Criteria A and C, and that the spillway and dam structural modifications – as planned at the time in 2001 – would have an adverse effect on this historic property. In return correspondence SHPO agreed with this determination (Appendix B).

Cultural resources investigations of the areas in close proximity to the dam, where a new spillway is proposed, were conducted in two phases. In 2004, Tulsa District completed an archaeological survey of Canadian Recreation area, located immediately west of the Canton Lake dam. The survey also included federal property immediately southwest of the dam. One prehistoric archaeological site, 34BL144, was identified (Hokanson and Fariello 2006). Concurrently, subsurface investigations utilizing a trackhoe were completed in an effort to identify buried archaeological sites in the southwestern portion of government property at Canton Lake. No buried cultural deposits were identified (Szarka and Briscoe 2004).

In 2006, a broader archaeological survey was conducted in the vicinity of the Canton Lake dam, including all government-owned land south and west of the dam. Again, backhoe trenching was employed in pre-selected areas as a means of investigating the potential for subsurface cultural deposits. Two historic archaeological sites, 34BL164 and 34BL165, were identified (Hokanson et al. 2006). Concurrently as a part of this fieldwork, ground penetrating radar (GPR) was utilized to investigate the perimeter of the historic Cheyenne-Arapaho cemetery which is located southwest of the Canton Lake dam. GPR investigations on the north and east sides of the cemetery revealed no evidence of graves outside current cemetery boundaries (Hokanson et al. 2006). While such graves could be identified in the future, the GPR study indicates that their existence is not probable, and the project should therefore have no (anticipated) effect on the historic cemetery.

In addition to the archaeological and GPR investigations, Tulsa District conducted historical and architectural research on the Canton Lake dam and two directly associated historic standing structures, the Overlook Building and the Overlook Café. The dam itself was reaffirmed as a historic property eligible for listing on the NRHP, and the

Overlook Building was recommended as eligible for the National Register as well. The Overlook Café was not recommended as NRHP-eligible.

In fall 2006, investigation results of the 2004-2006 archaeological investigations were coordinated with SHPO and OAS. Tulsa District determined that none of the three identified archaeological sites (34BL 144, 34BL164, and 34BL165) nor the Overlook Café, were eligible for listing on the National Register. However, concurring with report recommendations, Tulsa District determined that the Overlook Building was eligible for listing on the NRHP based on Criteria A and C. SHPO agreed that the Overlook Building is NRHP-eligible, but only as a contributing resource to the Canton Lake dam.

In the aforementioned Section 106 correspondence, Tulsa District also determined that the proposed spillway and dam modifications would adversely affect the Canton Lake dam and would have an adverse visual effect on the Overlook Building. SHPO and OAS agreed with these determinations. Subsequently, a Memorandum of Agreement (MOA) was proposed in order to resolve adverse effects. Again, SHPO and OAS agreed to resolve adverse effects through development of an MOA as required by 36 CFR Part 800. Also required under 36 CFR Part 800, Tulsa District notified the Advisory Council on Historic Preservation (ACHP) of the project's adverse effects on the Canton Lake dam and the Overlook Building. ACHP responded, declining to participate in the resolution of adverse effects and development of the MOA. Copies of all subject correspondence are included in Appendix B.

3.5.1 Environmental Impacts of the No Action alternative. The primary concern of choosing the "no action" alternative is a potential catastrophic failure of the dam. If this were to occur, a number of historic properties would be adversely affected or destroyed. Certain losses in this situation would include the dam itself, which is eligible for listing to the National Register of Historic Places (NRHP), and possibly the Overlook Building, which is also NRHP-eligible. While no historic properties were identified on government-owned land below the dam, there may be National Register-eligible prehistoric or historic archaeological sites or historic structures located on non-government owned land below the dam that could be adversely affected by a catastrophic failure. In this case, it is not entirely certain what the adverse effects might be. However, large-scale erosion of downstream lands could potentially be a problem all the way to Oklahoma City. A large scale historic properties reconnaissance and archaeological survey project would be necessary to estimate potential downstream impacts of a hypothetical catastrophic dam failure.

3.5.2 Environmental Impacts of the Proposed Plan alternative. Through a series of cultural resources investigations conducted during 2004-2006, Tulsa District has determined that two historic properties would be adversely affected by the proposed dam and spillway improvement projects at Canton Lake: Canton dam itself and the Overlook Building. One prehistoric archaeological site and two historic archaeological sites were identified in these investigations, none of which were determined to be eligible for listing on the National Register of Historic Places (NRHP). Consequently, none of the three archaeological sites would be adversely affected by the proposed project. One additional

historic standing structure, the Overlook Café, was identified and found to be ineligible for listing on the NRHP. Lastly, ground penetrating radar (GPR) investigations were conducted on the east and north sides of the historic Cheyenne-Arapaho cemetery located southwest of the Canton Lake dam. No graves were identified outside current cemetery boundaries, and therefore Tulsa District believes no adverse effect is determinable.

As required by 36 CFR Part 800, Tulsa District will draft a Memorandum of Agreement (MOA) to resolve adverse effects of the project on the two historic properties. Tentatively, SHPO and Tulsa District have agreed on the several stipulations to offset the adverse effects, including (1) providing copies of as-built construction drawings; (2) compiling photographic documentation; and (3) developing a historic context. Once an MOA is fully executed with SHPO and any interested parties (e.g., Cheyenne-Arapaho Indian Tribe of Oklahoma), Tulsa District will be in full compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) for the Canton Lake spillway and dam improvement project.

3.5.3 Cumulative Effects

Past Actions. Cumulative effects are difficult to address for cultural resources, particularly "what if" scenarios about past actions. Clearly, numerous historic standing structures and prehistoric and historic archaeological sites may have been submerged with the construction of Canton Lake. However, Canton Lake was completed in 1948, long before the enactment of the National Historic Preservation Act of 1966 (as amended), Section 106 of which drives the federal responsibility to consider impacts of undertakings on historic properties.

Present Actions. The impoundment of Canton Lake still today causes effects on historic properties, some of which may be considered adverse. These effects derive primarily from fluctuating conservation pool levels and the associated shoreline erosion impacts of those pool levels. Without a shoreline study and a site-by-site investigation of erosion impacts, however, assessing adverse effects will be difficult.

Future Actions. The current project is not likely to change conditions unless the conservation pool is dropped. It this occurs, the primary impacts may include the opening of sites to vandalism and shoreline erosion at the reduced conservation pool levels until the situation is rectified.

3.6 Air Quality. The primary legislation that governs federal air quality is the Clean Air Act Amendments of 1990. The CAAA delegates primary responsibility for clean air to the U.S. Environmental Protection Agency (EPA). The EPA published a Conformity Rule on November 30, 1993, requiring all federal actions to conform to appropriate State Implementation Plans established to improve ambient air quality. Areas are classified as either "attainment" or "non attainment" with respect to state and federal ambient air quality standards. The classifications are made by comparing actual monitored air pollutant concentrations to state and federal standards. The Conformity Rule applies to Federal actions in non-attainment areas. Canton, OK is in attainment and meets National

Ambient Air Quality Standards for the criteria pollutants designated in the Clean Air Act. Consequently, a conformity determination is not required.

The study area is located in a predominately rural area. The Oklahoma Department of Environmental Quality (ODEQ) monitors the air quality stations for criteria pollutants and air toxins. National Ambient Air Quality Standards exist for six pollutants: carbon monoxide, ozone, particulate matter smaller than 10μm, sulfur dioxide, nitrogen oxides, and lead. These "criteria pollutants" are the only ones for which standards have been established. The EPA assigns designations, based on an area's meeting, or "attaining" these standards. There is no air quality monitoring station located in Blaine County, Oklahoma. The nearest State and Local Air Monitoring Station (SLAMS) is located in Yukon, which is over 70 miles southeast of the project site, in Canadian County. Ozone is measured at this particular monitoring station. Particulate matter, nitrogen dioxide, lead and carbon monoxide are measured in Oklahoma City, Oklahoma County. Blaine County area is designated "In Attainment" for criteria pollutants and air toxins.

In 1999, Blaine County was ranked among the dirtiest/worst 20% of all counties in the United Stated in terms of pm-10 emissions (Scorecard, www.scorecard.org). Particulate matter (PM) includes dust, dirt, soot, smoke and liquid droplets directly emitted into the air by sources such as factories, power plants, cars, construction activity, fires and natural windblown dust. Particles formed in the atmosphere by condensation or the transformation of emitted gases such as sulfur dioxide (SO2) and volatile organic compounds (VOC) are also considered particulate matter. Blaine county ranked in the top 20% cleanest/best county in the United States for carbon monoxide, sulfur dioxide and volatile organic compound emissions (Scorecard, www.scorecard.org).

3.6.1 Environmental Impacts of the No Action alternative: There are no anticipated adverse impacts to air quality under the no action alternative. It is anticipated that the area would not see a significant increase in development and is expected to remain a rural community.

3.6.2 Environmental Impacts of the Proposed Plan alternative: Implementation of the recommended plan would have little adverse impacts to air quality. These impacts are considered to be short-term and would result from an increase in construction equipment and dirt moving activities. Particulate matter resulting from construction activities is a concern. Fine dust and other emissions would be controlled by implementing best management practices as mandated by federal, state and local agencies to reduce emissions. Construction vehicles and gasoline- or diesel-powered equipment would emit carbon monoxide, hydrocarbons, oxides of nitrogen and other contaminants. Traffic delays would increase vehicle emission near construction activities due to lower traffic speed. These impacts are considered to be short-term and are not expected to exceed threshold limits. Table 3-6 lists the National Ambient Air Quality Standards for each of the six criteria pollutants. A conformity analysis is not required as the project site is not in a non-attainment area.

Table 3-6 National Ambient Air Quality Standards (source: EPA)

Pollutant	Primary Stds.	Averaging Times	Secondary Stds.
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None
	35 ppm (40 mg/m^3)	1-hour[1]	None
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	Revoked[2]	Annual[2] (Arith. Mean)	
	150 µg/m^3	24-hour[3]	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual[4] (Arith. Mean)	Same as Primary
	35 µg/m^3	24-hour[5]	
Ozone	0.08 ppm	8-hour[6]	Same as Primary
	0.12 ppm	1-hour[7] (Applies only in limited areas)	Same as Primary
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-------
	0.14 ppm	24-hour[1]	-------
	-------	3-hour[1]	0.5 ppm (1300 µg/m^3)

1) Not to be exceeded more than once per year.

(2) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

(3) Not to be exceeded more than once per year on average over 3 years.

(4) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

(5) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

(6) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(7) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1, as determined by appendix H.

(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

3.6.3 Cumulative Effects.

Past Actions. Air quality emissions have occurred from non federal activities such as vehicle transportation, residential and industrial construction, industrial operations and agricultural activities as well as federal construction of Canton dam.

Present Actions. There are 36 facilities in Blaine County, OK that report air emissions. Three facilities are located in Canton, OK. All three of these facilities are associated with crude petroleum natural gas. They are all in compliance with current air quality standards. Air quality emission from vehicle transportation, residential use of small gas-powered engines, construction and agricultural practices all contribute to the current air quality in the project area. These emissions are considered short-term, but could impact the air quality during the summer when temperatures are hotter.

Future Actions. Commercial and industrial development around Canton Lake is not anticipated to increase. The area is anticipated to remain predominantly rural. The impacts of this federal action when considering cumulative effects would have no appreciable impact

3.7 Water Quality. The 1972 amendments to the Clean Water Act include Section 303(d). The regulations implementing Section 303(d) require states to develop lists of water bodies that do not meet water quality standards and to submit updated lists to the U.S. Environmental Protection Agency (EPA) every two years. Water quality standards include beneficial uses, water quality objectives and antidegradation requirements. EPA reviews the impaired water body lists submitted by each state and approves/disapproves all or part of the list.

For water bodies placed on the section 303(d) list, the law requires that States establish priority rankings for waters on the lists and develop a pollutant load reduction plan or Total Maximum Daily Loads (TMDL). TMDLs must document the nature of the water quality impairment, determine the maximum amount of a pollutant which can be discharged and still meet standards and identify allowable loads from the contributing sources.

Based on the 1995 Water Quality Report prepared by Tulsa District USACE, the water in Canton Lake was well oxygenated from top to bottom and exhibited only weak thermal stratification during the summer. Thermal stratification was considered temporary because of wind action. Alkalinity and pH values indicate the lake was well buffered and should not be subject to drastic pH changes. The water was very hard and contained fairly high concentrations of total dissolved solids such as sulfates and chlorides.

Concentrations of total dissolved solids and sulfate exceeded the limits of EPA recommended criteria suggested for a domestic water supply source. High concentrations of sulfate indicated a local geologic source rich in this ion. Chloride concentrations exceeded the criteria established by EPA for drinking water. Sulfates and chloride concentrations at levels recorded at Canton are not considered a health problem but may translate into higher treatment costs and corrosion of appliances and equipment.

As indicated in the 1995 report, the lake is classified as eutrophic if using total phosphorous as a parameter and hyper-eutrophic if using chlorophyll a as a parameter. Water samples obtained during 1995 were analyzed for presence of 11 metals. Six metals were detected but were not present at levels to cause concern.

Six metals were detected in the water samples during the 1995 water quality study, but none were considered to be at levels of immediate concern.

National Pollutant Discharge Elimination System (NPDES). A state-issued NPDES general permit is required for storm water discharge at construction sites involving one acre or more of land disturbance pursuant to Section 402 and 313 of the Clean Water Act.

According to the USACE Regulatory Office a Section 404 permit for a temporary construction access road across the North Canadian River is required (Appendix B). A permit has been issued for nationwide permit 33 for Temporary Construction access and Dewatering. The permit identification number is 15866. USACE would follow and adhere to the special conditions outlined in the permit

3.7.1 Environmental Impacts of the No Action alternative: There are no anticipated adverse impacts to water quality under the no action alternative. Development of the lakeshore is not expected to increase. Current trends in water quality would be expected to continue.

3.7.2 Environmental Impacts of the Proposed Plan alternative: It is anticipated that there may be short-term minor adverse impacts to water quality in the immediate area of construction. Best management practices would be implemented to prevent sediments from eroding and entering waterways. Removal of the earthen berm after the spillway is constructed would result in an increase in turbidity and sediments entering the water. The impact is considered to short-term and minor and should return to baseline levels within a few days following completion. Construction of the temporary access road across the river below the dam is expected to increase turbidity of the water in the tailwater but is expected to be short-term and the water should clear up within a day.

A NPDES permit would be required since implementation of the proposed plan would disturb approximately 194.5 acres. The permit would be obtained during the planning, engineering and design phase and prior to implementation of the project. Plans for control of sedimentation and erosion are required for approval by the Oklahoma Department of Environmental Quality pursuant to section 313 and 319 of the Clean Water Act. Impacts to water quality are anticipated to be short-term and minor due to the beneficial use of best management practices.

3.7.3 Cumulative Effects

Past Actions**.** Canton Lake impoundment started in 1947 and was completed in May 1948. Impoundment of rivers can affect water quality in several ways. Plant nutrients and other inorganic solutes leach from the flooded soil and are released by decaying flooded vegetation increasing phytoplankton, algae and total dissolved solids in the reservoir (Baxter and Glaude .1980). In larger reservoirs, considerable quantities of phosphorous were leached from the flooded terrain (Osrofsky and Duthie. 1978). Toxic substances may also be released from newly flooded soil. Thermal stratification can occur and water releases from the dam to the receiving stream could be low in dissolved oxygen.

Present Actions. Canton Lake was listed on the section 303(d) list as impaired for pesticides, nutrients, suspended solids and siltation. However in the 2002 Water Quality Integrated Report, justification document it was removed from the list and the reasons given were insufficient data or an error on listing due to high flow turbidity sampling (2002 Integrated Report). The North Canadian River above Canton Lake was

listed on Oklahoma's section 303(d) list for pathogens and turbidity in the 2002 Water Quality Integrated Report.

Turbidity and sedimentation of the water bodies around Canton Lake are controlled by implementing best management practices for dirt moving activities in excess of 1 acre occurring on Federal lands around the lake. The USACE can monitor and control activities occurring on lands that they own, however activities occurring in the watershed outside of USACE control is enforced by ODEQ. Silt fences and hay bales are not always installed correctly or maintained and sediment laden runoff does flow into adjacent water bodies. Erosion is a natural occurrence and if not controlled in a timely manner can lead to sediment laden runoff flowing into adjacent water bodies.

Future Actions. Water quality is expected to exhibit current trends. The lands immediately adjacent to the lake would continue to be licensed to ODWC and managed for wildlife. An increase in impervious surfaces or development is not anticipated immediately adjacent to the lake. Development in the watershed would be expected to follow current trends. Soil erosion would continue to cause turbidity in local streams and rivers. Large flow events would be expected to carry sediment to the lake. The impacts of this federal action when considering cumulative effects would have no appreciable impact

3.8 Hazardous, Toxic, or Radiological Waste (HTRW). Potential for discovery of hazardous material at Canton damsite and within the project area was evaluated through examination of historic and current land use, review of environmental data bases, interviews with local regulatory personnel, and visual observations. The potential for HTRW discovery and significant problems related to HTRW during project construction is believed to be low.

Land use adjacent to the project area is primarily agricultural. These lands have not been subject to industrial development or other land use activities with associated potential for significant contamination.

A search of environmental databases revealed no documented areas of contamination near the project location. A search of the Comprehensive Environmental Response, Compensation, and Liability Information system (CERCLIS) database and the Resource Conservation and Recovery Information System (RCRIS) database failed to produce any CERCLA sites or small quantity generators in the Blaine county areas or proposed project area.

In addition to searches of environmental databases, local personnel from the Canton Lake office were contacted for information related to potential areas of contamination that could affect project construction or operation. All individuals contacted were unaware of any HTRW related issues near the project area.

Finally, a site visit was conducted on October 19, 2006. The site visit included a search for visual evidence of potential HTRW related problems. The site visit consisted of

walking the project areas as well as visual reconnaissance of surrounding areas. Areas of soil staining, evidence of unusual vegetative distress, drums or containerized waste, unusual topography (mounds or depressions), or other visual evidence of potential contamination were not noted at any location.

Based on this information, there is a low probability of HTRW related problems from documented areas of local contamination. There is no reason to believe that environmental media in the project area have been significantly contaminated by past or current land practices or by releases from adjoining properties.

3.8.1 Environmental Impacts of the No Action alternative. Land use adjacent to the project area is primarily agricultural. These lands have not been subject to industrial development or other land use activities with associated potential for contamination. However, a two-lane highway is located along the damsite alignment and could be a potential source for HTRW contamination resulting from a major accident on the interstate.

3.8.2 Environmental Impacts of the Proposed Plan alternative. Potential for discovery of hazardous material at the project site was evaluated through examination of historic and current land use, review of environmental data bases, interviews with local regulatory personnel, and visual observations. The potential for HTRW discovery and problems related to HTRW during project construction is believed to be low.

The potential exists for poorly maintained construction equipment to leak hydraulic oil and for there to be minor leaks and spills at a construction site. Best management practices would be implemented to ensure construction equipment is well-maintained and breakdowns are handled immediately. Temporary fueling stations and fuel tanks would be installed according to State requirements. Absorbent materials, pads and booms would be maintained at the site and personnel trained in proper spill cleanup techniques and procedures.

3.8.3 Cumulative Effects.

Past Actions. The USACE project office used to have two 1,000 gallon underground storage tanks (UST) and one 500 gallon UST for fuel. The 500 gallon tank was removed in 1992 and the two 1,000 gallon tanks were removed in 1994. A review of project records indicates there were no contamination issues resulting from the tank removal. In 1992, a 280 gallon UST was installed and in 1994 a 500 gallon above ground storage tank (AST) was installed.

Present Actions. The USACE and ODWC implements best management practices to manage hazardous materials. The USACE still operates and maintains both the 280 gallon UST and the 500 gallon AST. The ODWC operates and maintains one 300 gallon AST for fuel. Through the Environmental Review Guide to Operations (ERGO) program, environmental inspections are conducted internally annually and externally every 5 years. There have been no notices of violation or major actions requiring correction.

According to EPA's website there are two facilities that are regulated for Toxic Release Inventory in Blaine County. Both facilities are in compliance with current standards.

Future Actions. There is no indication that HTRW would change from current trends. There are no plans for industrial development in the vicinity of the lake. There area is expected to remain rural in nature with little change in current land uses. The annual internal ERGO inspections and the external ERGO inspections are expected to continue. Best management practices would continue to be utilized to address HTRW issues. Every effort would be implemented to prevent violations and comply with current Federal, State and local laws. The impacts of this federal action when considering cumulative effects would have no appreciable impact

3.9 Noise Occupational noise exposure is regulated by Title 29 Code of Federal Regulations (CFR), Part 1910, subpart G. The U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) is the enforcing agency. OSHA has established noise exposure standards in order to protect the hearing of employees. Noise exposure for the construction industry is regulated by Title 29 CFR, Part 1926.52, and Occupational Noise Exposure. Canton Lake and Dam is located in a predominantly rural area. Traffic in the area is moderate during the recreation season May through September and light during the off-season. There is no heavy industry in the immediate vicinity.

Noise levels are measured in decibels (dB). General conversation is about 70 dB. When dBA goes up a little, noise goes up a lot, for example, 73 dB is 2 times as loud as 70 dB (CPWR, www.cpwr.com/hazpdfs/kfnoise.pdf).

3.9.1 Environmental Impacts of the No Action alternative: Noise levels would be expected to continue at there present levels.

3.9.2 Environmental Impacts of the Proposed Plan alternative: Implementation of the recommended plan would result in temporary increases in the noise levels in the area. Table 3-2 lists the dB levels for various types of equipment.

Table 3-7 Noise Level in dB at 50-Feet Source: EPA

Equipment	Decibels	Equipment	Decibels
Crane	75-87	Earthmover	87-94
Bulldozer	80	Backhoe	72-93
Front-end loader	72-84	Earth tamper	74-77
Pneumatic chip hammer	103-113	Jackhammer	81-98
Portable saw	88-102	Scraper	80-93
Concrete pump	81-84	Hammer	87-95
Dump Truck	81-98	Truck	83-94
Grader	80-93	Roller	73-75
Pneumatic tools	81-98	Concrete vibrator	76
Welding generator	71-82	Concrete mixer	74-88
Cement trucks	83-94	Air compressor	74-87

Heavy equipment such as backhoes, front-end loaders and dump trucks would cause short-term, localized, minor increases in noise levels. These short-term increases are not expected to substantially affect adjacent noise sensitive receptors or wildlife areas. Construction activities would increase noise levels temporarily at locations immediately adjacent to the project area, but would be attenuated by distance, topography and vegetation. Noise levels from a point source such as a piece of construction equipment would attenuate 9 dB per doubling of distance over a vegetated surface (EPA).

Noise levels created by construction equipment would vary greatly depending on factors such as the type of equipment, the specific model, the operation being performed, and the condition of the equipment. The equivalent sound level of the construction activity also depends on the fraction of time that the equipment is operated over the period of construction. Construction would occur only during daylight hours.

For on-site construction workers, the permissible exposure limits (PEL) and requirements for noise control are an 8-hour time-weighted average exposure level (TWA) of 90 dBA with a 5-dBA exchange rate between allowable duration and noise level. Engineering or administrative controls would be implemented above this level, and hearing protection devices would be worn when exposures exceed the PEL.

Traffic noise represents a potential source for short term noise impacts. If all other factors remain the same, it would take a 22% increase in traffic volume to cause a 1 dB increase in noise levels, a 58% increase to cause a 2dB increase and a 100% increase to cause a 3 dB increase. Even if the increase in traffic at the construction site is 100%, the impact is considered minor as documented studies have shown that a 2 to 3 dB increase in noise levels is imperceptible to most observers (Federal Highway Administration, 1973)

It is anticipated that blasting activities would take place in constructing the auxiliary spillway. This would also result in temporary, short-term, minor adverse impacts to the noise levels in the area.

Best management measures would be implemented to reduce noise levels to adjacent properties.

- All construction equipment would be equipped with mufflers and would be maintained in good working order
- Adjacent communities would be notified when blasting activities are scheduled to occur.

3.9.3 Cumulative Effects

Past Actions. Noise levels increased during the construction of the lake and spillway. The area was predominantly rural with farmhouses scattered throughout the area. Wildlife moved temporarily away from the noise created by the construction, but returned to the area once construction was complete. Construction activities and traffic

caused background noise levels to increase temporarily. Equipment and technology was not at the standards they are today so it is anticipated that noise levels were greater than they would be today

Present Actions. The area is rural and primarily an agriculture community. Highway 58A follows the alignment of the dam. Traffic increases during the recreation season from May through September and then decreases during the off-season, but is still considered light traffic. Heavy traffic measured at 50-ft would have a reading of 80 dB. Light traffic at 100-ft would have a reading of 50 dB. By comparison, conversation is measured at 60 dB at 1 meter, rustling of leaves is 10 dB, loud farm machinery is 20 dB (EPA).

Future Actions. Construction is anticipated to take approximately 5 years. Once construction is complete, noise levels would be expected to return to current levels. The area is expected to remain primarily agriculture. Economic growth would follow current trends, it is not anticipated the local community would increase in size tremendously. Traffic may increase slightly but would not be expected to reach levels that would adversely impact the community. The impacts of this federal action when considering cumulative effects would have no appreciable impact

3.10 Mitigation Summary. Project related impacts were identified during alternative formulation and data gathering for the environmental assessment and coordination with the USFWS and ODWC. The Council for Environmental Quality regulations for implementing NEPA provide guidelines for formulating measures to offset impacts resulting from a proposed action (40 CFR 1508.20). The guidelines consist of five (5) sequential steps, (1) avoid the impact altogether; (2) minimizing the impact by limiting the degree or magnitude of the action; (3) rectify the impact by repairing, rehabilitating or restoring the affected environment; (4) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action; and (5) compensate for unavoidable impacts by replacing or providing substitute resources or environments.

The proposed plan would impact the following:

LOCATION		TOTAL ACREAGE
Project Lands		**83.5 acres**
Blaine's Park (Frank Raab Nature Trail)	34 acres	
Riverside Park (Prairie Dog Town)	32 acres	
Other (Highway realignment)	17.5 acres	
ODWC Licensed Land		**111 acres**
Wetlands	5.5 acres	
Farmland	20 acres	
Forest	85.5 acres	
Total Lands Impacted		**194.5 acres**

Project lands are utilized to carry out the USACE mission including flood control and recreation. For these reasons, impacts to the 83.5 acres of project lands would not be mitigated as these lands are being used to correct design problems with the existing flood control structure. However, the prairie dog town located at Riverside Park within the alignment of the proposed auxiliary spillway would be relocated to a location in the vicinity of their current town. The prairie dog town is approximately 6 acres and consists of approximately 120 prairie dogs.

Impacts to the 111 acres licensed to ODWC would be mitigated for in the following manner:

(g) USACE would ensure water flow to the wetlands downstream from the proposed spoil berm. This would be accomplished by installing relief wells in the vicinity of the wetlands that would supply water to the wetlands.
(h) USACE would acquire 20 acres located on the southwest end of Canton Lake for wildlife management
(i) USACE would provide funds to ODWC for natural resource improvements such as aquatic habitat restoration, invasive species control, wetland creation, native prairie and bottomland hardwood restoration. The exact funds provided to ODWC would be based on the value of the land impacted minus other environmental improvements implemented by USACE as mitigation for implementation of the proposed plan.
(j) USACE would seed the spoil berm with native prairie grass seed mix.
(k) USACE would construct two bald eagle roosting platforms at a location designated by USFWS.

TABLE 4-1

RELATIONSHIP OF PLANS TO ENVIRONMENTAL PROTECTION STATUTES AND OTHER ENVIRONMENTAL REQUIREMENTS

Policies	Compliance of Alternatives
Federal	
Archeological and Historic Preservation Act, 1974, as amended, 16 U.S.C. 469, et seq	All plans in full compliance
Clean Air Act, as amended, 42 U.S.C. 7609, et seq	All plans in full compliance
Clean Water Act, 1977, as amended (Federal Water Pollution Control Act), 33 U.S.C. 1251, et seq	All plans in full compliance
Endangered Species Act, 1973, as amended, 16 U.S.C. 1531, et seq	All plans in full compliance
Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1-12, et seq	All plans in full compliance
Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661, et seq	All plans in full compliance
Land and Water Conservation Fund Act, 1965, as amended, 16 U.S.C. 4601, et seq	All plans in full compliance
National Historic Preservation Act, 1966, as amended, 16 U.S.C. 470a, et seq	All plans in full compliance
National Environmental Policy Act, as amended, 42 U.S.C. 4321, et seq	All plans in full compliance (1)
Native American Graves Protection and Repatriation Act, 1990, 25 U.S.C. 3001-13, et seq	All plans in full compliance
Rivers and Harbors Act, 33 U.S.C. 401, et seq	All plans in full compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et seq	All plans in full compliance
Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et seq	All plans in full compliance
Water Resources Planning Act, 1965	All plans in full compliance
Floodplain Management (E.O. 11988)	All plans in full compliance
Protection of Wetlands (E.O. 11990)	All plans in full compliance
Environmental Justice (E.O. 12898)	All plans in full compliance
Protection of Children (E.O. 13045)	All plans in full compliance
Farmland Protection Policy Act, 7 U.S.C. 4201, et seq	All plans in full compliance

Note: Full Compliance - Having met all requirements of the statutes, Executive Orders, or other environmental requirements for the current stage of planning.

(1) National Environmental Policy Act of 1969 requires an environmental review prior to a Federal agency making an irretrievable commitment of Federal resources..

5.0 FEDERAL, STATE AND LOCAL COORDINATION

The draft report was coordinated with the following agencies having legislative and administrative responsibilities for environmental protection. The mailing list for the public review period for this draft report is in Appendix A.

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey
Natural Resources Conservation Service
Oklahoma Archeological Survey
Oklahoma State Historic Preservation Officer
Oklahoma Department of Environmental Quality
Oklahoma Water Resources Board
Oklahoma Department of Wildlife Conservation
Cheyenne-Arapaho Tribes of Oklahoma
Comanche Nation of Oklahoma
Kiowa Indian Tribe of Oklahoma
Muscogee (Creek) Nation of Oklahoma
Caddo Tribe of Oklahoma
Wichita and Affiliated Tribes
Osage Nation of Oklahoma
Seminole Nation of Oklahoma

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