Environmental Assessment
Proposed Dam Safety Modifications
Lewisville Dam
Elm Fork of the Trinity River
Lewisville, Texas

National Inventory of Dams NIDID: TX00008






September 2016

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DRAFT FINDING OF NO SIGNIFICANT IMPACT
PROPOSED DAM SAFETY MODIFICATIONS LEWISVILLE DAM

ELM FORK OF THE TRINITY RIVER
LEWISVILLE, TEXAS

Description of Action. The United States Army Corps of Engineers (USACE) has prepared an Environmental Assessment (EA) to assess the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. Lewisville Dam and Lake were initially authorized by the Rivers and Harbors Act of 1945 (Public Law 79-14) for improvements on the Trinity River and tributaries for navigation, flood control, and allied purposes. The Water Supply Act of 1958, as amended, (43 United States Code § 390b) provided for storage and made it available for municipal and industrial water supply. The Rivers and Harbors Act of 1965 (Public Law 89-298, 79, Stat. 1091) modified the authorization provided by Rivers and Harbors Act of 1945 by requiring a reevaluation report for any navigation features. Engineering Regulation 1110-2-1156 (final March 31, 2014) prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within USACE.

The purpose of the Proposed Action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The Proposed Action accomplishes this by addressing the seepage deficiencies, spillway weir instability, and apron failure at the Lewisville Dam for safe and effective functioning at authorized capacity, while reducing the risk to the downstream public to tolerable levels. The Proposed Action is needed to establish the Lewisville Dam as a safe facility that meets USACE risk reduction guidelines for existing dams and allows the project to continue providing the benefits for which it was authorized.

The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address the identified deficiencies. While none of the potential failure modes (PFMs) identified are likely to occur, the proposed modifications focus on the “risk driving” PFMs. Under the Proposed Action, the USACE would reduce risk of dam failure from seepage deficiencies at two different locations by constructing downstream inverted filter berms with associated collection trenches for seepage flow at each location. The USACE would reduce the risk of dam failure associated with spillway instability by constructing post-tensioned anchors with an upstream geomembrane cutoff to support the spillway structure, overlay the apron on the downstream side of the spillway, and construct two barrier walls downstream of the spillway to prevent the apron panels from moving and to reduce channel scour and erosion during spillway flow events.

Three additional PFMs have been incorporated into the Proposed Action. While these three PFMs are not risk driving, their inclusion takes advantage of construction efficiencies and does reduce the overall risk of failure. To reduce risk associated with erosion at the outlet conduit, the USACE would construct a new conduit to reduce stress from high volume flows. To reduce risk associated with slides on the upstream side of the embankment, the USACE would increase the embankment berm to a 4:1 upstream slope and a maximum elevation of 537 feet above sea level. The berm would be reinforced at the base with riprap to reduce wave erosion. Lastly, the USACE is requiring the City of Lewisville to relocate waterlines that currently encroach on the embankment to reduce the risk of embankment erosion from a waterline rupture.

In order to accomplish the identified risk reduction measures, access roads, staging areas, and borrow sites, needed for construction, are included as part of the Proposed Action. There would be two designated borrow sites, one 56.4 acres and the other 32.1 acres. The location of the borrow sites were chosen based on having geotechnically suitable fill material and the least adverse impacts to existing resources and activities within the Project Area. Upon construction completion, any excess fill material would be returned to the borrow sites, and the sites would be graded to be as consistent with existing, surrounding topography, as possible. After the modifications to the embankment are complete, USACE would also establish a 50-foot wide "vegetation clear zone" adjacent to the embankment where vegetation would be regularly mowed.

After the borrow areas have been graded, USACE would implement habitat measures to create enhanced savanna habitat. The habitat measures would include the seeding of native forbs and grasses, as well as the planting of mast-producing trees and flowering shrubs. The intent of the plantings would be to create a landscape more consistent with historic prairie and savanna conditions, as well as to foster habitat suitable for various pollinator species.

The proposed dam safety modifications would reduce the risk of dam failure to within USACE's full tolerable risk guidelines. Construction is proposed to begin in early 2018 and continue in phases through mid-2024. The Proposed Action would occur on the Lewisville Dam and adjoining lake project lands located south of the embankment.

<u>Anticipated Environmental Effects</u>. Through the planning process, USACE developed eight options for implementing the Proposed Action. However, because the potential impacts associated with the each option were virtually identical, USACE is moving forward with only one action alternative. USACE also considered the No Action Alternative. Under the No Action Alternative, no dam safety modifications would be implemented, and the risk associated with dam failure would persist. While the probability of dam failure would remain remote, the risk associated with failure would increase, as the increasing population within the Study Area would result in increased consequences in the event of dam failure.

Implementation of the Proposed Action would not result in significant impacts on the social, economic, or human, and natural environment. No adverse impact on any species that are proposed or listed as threatened or endangered under the Endangered Species Act would occur. Beneficial impacts to biological resources, and specifically savanna habitat and pollinators, would occur with the implementation of the habitat measures. No significant geological, water resources, public health and safety, air quality, cultural, utilities, recreation, transportation, socioeconomics and environmental justice, or climate impacts were identified within the Project Area. The Proposed Action would impact 10.5 acres of jurisdictional waters of the U.S., including up to 1.0 acre of permanent impacts to emergent wetlands, 4.4 acres of temporary impacts to emergent wetlands and 5.1 acres of permanent impacts to open water. After the proposed modifications are complete, the impacted areas would return to pre-construction conditions. Long-term effects of the Proposed Action would be beneficial.

Facts and Conclusions. Based on a review of the information contained in this EA, it is concluded that the implementation of the Lewisville Dam Safety Modifications in Lewisville, Texas is not a major federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended.

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Calvin C. Hudson II Colonel, U.S. Army Corps of Engineers District Engineer	Date

Acronyms and Abbreviations

%	percent
ACE	Annual Chance Exceedance
AEP	annual exceedance probability
APE	Area of Potential Effect
AQCR	Air Quality Control Region
BCC	Birds of Conservation Concern
BCRA	Base Condition Risk Assessment
BMP	best management practice
CAA	Clean Air Act
CAP	Contingency Action Plan
CDC	Corridor Development Certificate
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
CWA	Clean Water Act
dbh	diameter at breast height
DCTA	Denton County Transit Authority
DFW	Dallas-Fort Worth International Airport
DGNO	Dallas, Garland & Northeastern Railroad
DSAC	Dam Safety Action Classification
DSMS	Dam Safety Modification Study
EA	Environmental Assessment
EDR	Environmental Data Resources, Inc.
EIS	Environmental Impact Statement
EO	Executive Order
EPP	Environmental Protection Plan
ER	Engineering Regulation
ESA	Endangered Species Act
°F	degrees Fahrenheit
FEMA	Federal Emergency Management Agency
FWPC	Future without Project Condition
FY	fiscal year
GCR	General Conformity Rule
GHG	greenhouse gases
gpm	gallons per minute
H&H	hydrology and hydraulic
HEC-RAS	Hydrologic Engineering Center - River Analysis System
HEP	Habitat Evaluation Procedures
HSI	habitat suitability index
HU	habitat unit
IBI	Index of Biotic Integrity
IH	Interstate Highway
IPaC	Information for Planning and Conservation
LAERF	Lewisville Aquatic Ecosystem Research Facility
LLELA	Lewisville Lake Environmental Learning Area
MBTA	Migratory Bird Treaty Act
msl	mean sea level
N/A	not applicable
NAAQS	National Ambient Air Quality Standards
NCTCOG	North Central Texas Council of Governments
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NOA	Notice of Availability
NOI	Notice of Intent
NRHP	National Register of Historic Places
O_3	ozone
O&M	operation and maintenance
PAL	Planning Aid Letter
PAR	Planning Aid Report
Pb	lead
PD	Planned Development
PFM	potential failure modes
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppb	parts per billion
ppm	parts per million
ROD	Record of Decision
ROI	region of influence
SAFETEA-LU	Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users
SCM	special conservation measures
SH	State Highway
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPF	Standard Project Flood
spp.	species
SPRA	Screening Portfolio Risk Analysis
SWPPP	Stormwater Pollution Prevention Plan
TAC	Texas Agricultural Code
TCEQ	Texas Commission on Environmental Quality
TDA	Texas Department of Agriculture
THC	Texas Historical Commission
TIP	Transportation Improvement Program
TIPPC	Texas Invasive Plant and Pest Council
TMDL	total maximum daily load
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department

TREIS	Trinity River and Tributaries Environmental Impact Statement
TSWQS	Texas Surface Water Quality Standards
TxDOT	Texas Department of Transportation
TXNDD	Texas Natural Diversity Database
$\mu g/m^3$	micrograms per cubic meter
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
VOC	volatile organic compound

PROPOSED LEWISVILLE DAM SAFETY MODIFICATIONS ENVIRONMENTAL ASSESSMENT

Lead Agency for the EA: United States Army Corps of Engineers, Fort Worth District

Title of Proposed Action: Dam Safety Modifications, Lewisville Dam, Elm Fork of the Trinity River, Lewisville, Texas; National Inventory of Dams NIDID: TX00008

Designation: Environmental Assessment

ABSTRACT

The United States Army Corps of Engineers (USACE) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969 (42 United States Code §§ 4321, *et seq*.), the Council on Environmental Quality regulations found in 40 Code of Federal Regulations (CFR) Parts 1500-1508, and USACE regulations found in 33 CFR Part 230. This EA describes the potential environmental consequences resulting from implementation of proposed safety modifications to the Lewisville Dam in the City of Lewisville, Texas (i.e., the "Proposed Action"). The purpose of the Proposed Action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The Proposed Action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide benefits for which it was authorized.

Lewisville Dam and Lake was initially authorized by the Rivers and Harbors Act of 1945 (Public Law 79-14) for improvements on the Trinity River and tributaries for navigation, flood control, and allied purposes. The USACE Engineering Regulation 1110-2-1156 (final March 31, 2014) prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within the USACE.

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EXECUTIVE SUMMARY

The United States Army Corps of Engineers (USACE) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act of 1969 (42 United States Code [USC] §§ 4321, *et seq*.), the Council on Environmental Quality regulations found in 40 Code of Federal Regulations (CFR) Parts 1500-1508, and USACE regulations found in 33 CFR Part 230. This EA describes the potential environmental consequences resulting from implementation of proposed safety modifications to the Lewisville Dam in Lewisville, Texas. Lewisville Lake is located in the southern portion of Denton County in north-central Texas. The lake is approximately 22 miles northwest of the City of Dallas central business district and is at the northern boundary of the City of Lewisville. Lewisville Lake is located in the Trinity River basin along the Elm Fork of the Trinity River. Lewisville Dam is located at the southeastern end of Lewisville Lake.

The USACE manages and maintains Lewisville Lake for flood control. Secondary uses of the lake include water supply for the cities of Dallas and Denton, as well as fish and wildlife management, recreation, hydroelectric power generation, and educational uses. Lewisville Lake works in concert with other Trinity River watershed lakes and impoundments to hold back floodwaters during and after rain events and slow the rate of runoff into the Trinity River channel and its tributaries.

While Lewisville Dam is still functioning as designed, dam safety studies conducted in 2005 identified deficiencies based on current USACE criteria in the dam's structure. While failure is of a very remote probability, the risk to human life and property should failure occur is high enough to warrant remediation of the identified deficiencies.

The purpose of the Proposed Action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The Proposed Action accomplishes this by remediating the seepage deficiencies, spillway weir instability and apron failure at the Lewisville Dam for safe and effective functioning at authorized capacity, while reducing the risk to the downstream public to tolerable levels. The Proposed Action is needed to establish the Lewisville Dam as a safe facility that meets USACE risk reduction guidelines for existing dams and allows the project to provide the benefits for which it was authorized.

Lewisville Dam and Lake was initially authorized by the Rivers and Harbors Act of 1945 (Public Law 79-14) for improvements on the Trinity River and tributaries for navigation, flood control, and allied purposes. The Water Supply Act of 1958, as amended, (43 USC § 390b) provides for storage and made it available for municipal and industrial water supply. The Rivers and Harbors Act of 1965 (Public Law 89-298, 79, Stat. 1091) modified the authorization provided by Rivers and Harbors Act of 1945 by requiring a reevaluation report for any navigation features. The Flood Control Act of 1970, Section 221 (42 USC §§ 1962d-5b) provides guidance with regard to payments for conservation storage. The USACE Engineering Regulation 1110-2-1156 (final March 31, 2014) prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within the USACE. When unusual circumstances threaten the integrity of a structure and the safety of the public, the USACE has the authority to take expedient actions, require personnel to evaluate the threat, and design and construct a solution.

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PROPOSED LEWISVILLE DAM SAFETY MODIFICATIONS
ENVIRONMENTAL ASSESSMENT
SEPTEMBER 2016

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CHAPTER 1
PURPOSE AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

The United States Army Corps of Engineers (USACE) has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] Section 4321, *et seq*.), the Council on Environmental Quality (CEQ) regulations found in 40 Code of Federal Regulations (CFR) Parts 1500-1508, USACE regulations found in 33 CFR Part 230, and the USACE Engineering Regulation (ER) 200-2-2, dated March 4, 1988, *Procedures for Implementing NEPA*. This EA describes the potential environmental consequences resulting from implementation of proposed safety modifications at the Lewisville Dam in the City of Lewisville, Texas.

1.2 STUDY AREA

Lewisville Lake is located in the southern portion of Denton County in north-central Texas (Figure 1-1). The lake is approximately 22 miles northwest of the City of Dallas central business district and is at the northern boundary of the City of Lewisville. The lake is approximately 12 miles long and over 5 miles wide in several locations. Lewisville Lake is located in the Trinity River basin along the Elm Fork of the Trinity River.

The USACE has modelled the area potentially inundated in the event of the failure of Lewisville Dam. As 96 percent (%) of the economic damages and 98% of the life safety impacts that would result in the event of dam failure would be within Denton and Dallas Counties, the overall Study Area is defined as the potential inundation area within Denton and Dallas Counties. However, because the majority of this EA focuses on the locations that would be directly impacted by the implementation of proposed safety modifications, a smaller and more specific Project Area has been identified within the larger Study Area. This Project Area is limited to the USACE-owned project lands downstream of the dam and is shown on Figure 1-1.

1.2.1 Project Area Description

Lewisville Lake was constructed by impounding the Elm Fork of the Trinity River. Lewisville Lake is owned and operated by the USACE. The major physical features of the Lewisville Dam include the embankment, outlet works, and a spillway (Figure 1-2). The primary purpose of the lake is flood control. Associated purposes include water supply for the cities of Dallas and Denton, fish and wildlife management, recreation, hydroelectric power generation, and educational resources. The operation of Lewisville Lake was modified in 1988 as part of the construction of Ray Roberts Lake, located upstream of Lewisville Lake, resulting in a permanent increase of the conservation pool elevation from 515 feet above mean sea level (msl) to the current 522 feet above msl.

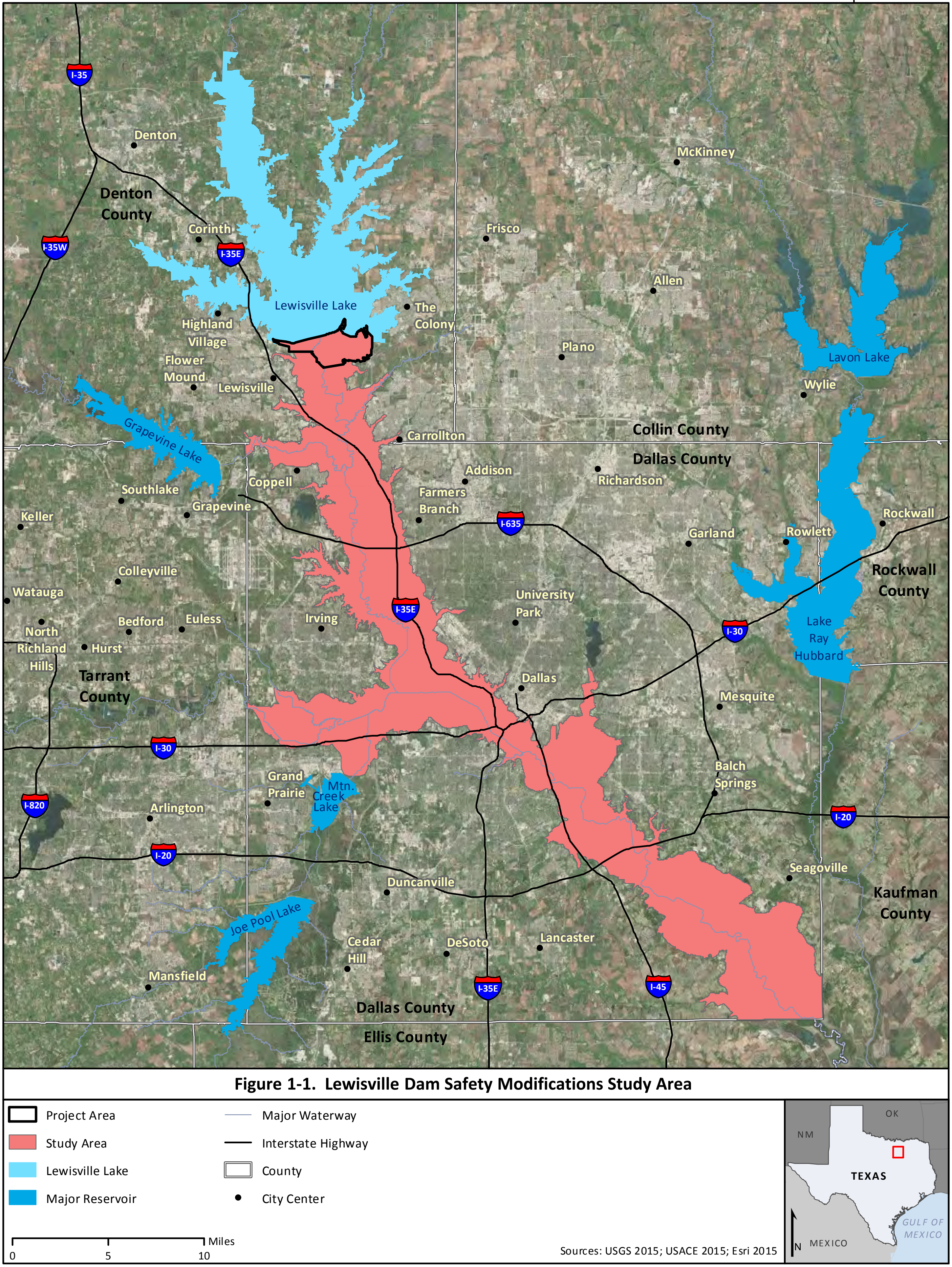


Figure 1-1. Lewisville Dam Safety Modifications Study Area

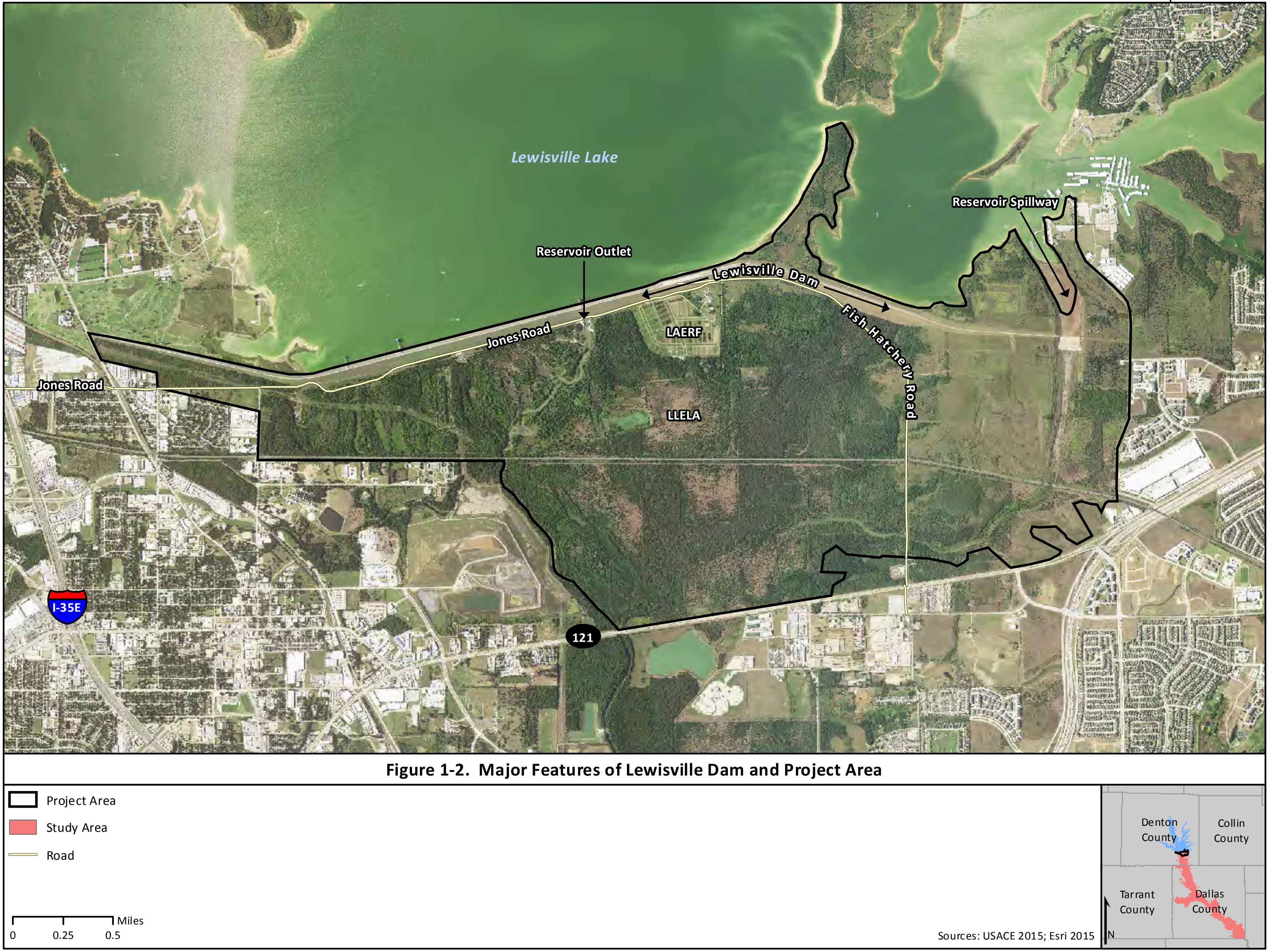


Figure 1-2. Major Features of Lewisville Dam and Project Area

A total of 599,000 acre-feet of water (at conservation pool) is stored in Lewisville Lake for municipal and industrial purposes. An additional 325,700 acre-feet is allocated for floodwater storage. The Cities of Dallas and Denton contributed funds for construction in order to provide citizens with a municipal water source. From 1955 through 2015, it has been estimated that the accumulated potential flood damage prevented by Lewisville Lake and Ray Roberts Lake flood control capabilities was approximately $55.6 billion (USACE 2016).

1.2.2 Description of the Lewisville Dam

The Lewisville Dam consists of an earthen embankment, an uncontrolled concrete ogee weir spillway, a gated outlet works, and two municipal water supply intakes constructed by local sponsors (the City of Dallas and the City of Denton). The following subsections provide descriptive information of the Lewisville Lake Project features, as well as its current safety classification.

1.2.2.1 Embankment

The embankment is 32,328 feet long with a maximum height of 125 feet and a crest width of 20 feet. The dam was designed as an impervious structure. It was built using materials obtained from onsite borrow sites and excavations. Also incorporated into the design of the dam was a 3- to 4-foot-thick granular drainage blanket underneath the downstream section of the embankment. A typical cross-section of the embankment is shown in Figure 1-3.

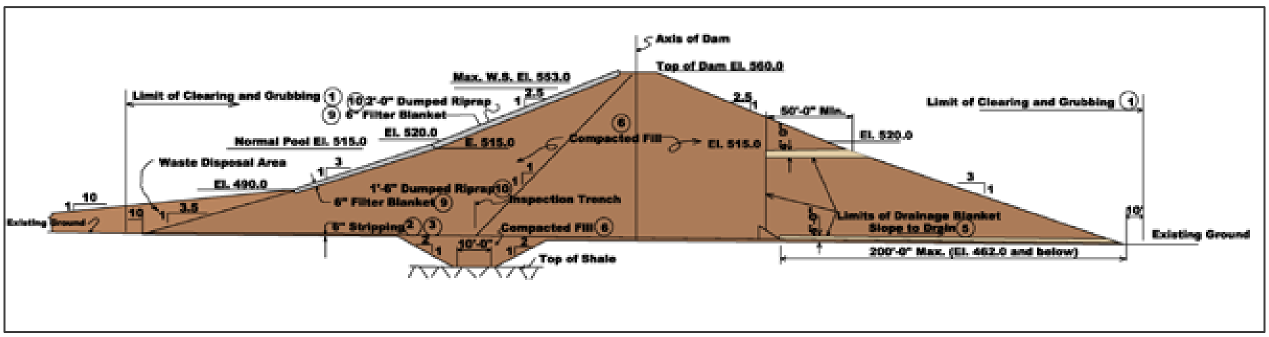


Figure 1-3 Lewisville Dam: Typical Embankment Section

Note: The upper elevation limit of the drainage blanket is projected onto the typical section.

In order to minimize sliding of the embankment, modifications consisting of upstream and downstream berms were designed for some portions of the embankment and constructed from materials obtained from the spillway excavation. Upstream berms were constructed in 1979; downstream berms and a seepage collection system including a drainage blanket extension and toe drain were constructed in 1981. The upper slopes on the downstream face of the embankment were modified in 1983.

In addition to USACE-implemented modifications, two water supply intakes were constructed by nearby municipalities. These intakes pump water from the reservoir through pipes installed through the embankment crest and down the downstream face of the dam. The water supply lines run parallel to the dam immediately downstream of the embankment toe.

1.2.2.2 Outlet Works

The outlet works consist of an intake structure with operating house, an approach channel, slab and walls, a 16-foot diameter conduit, a conduit portal unit, stilling basin, and a service bridge. The 64-foot long approach slab and walls are a reinforced concrete U-channel approximately 32-feet wide. The average height of the walls is 25 feet, and a 36-foot long reinforced concrete wing wall is located on the upstream end of each wall. The reinforced concrete intake structure is approximately 113-feet high from top of rock to the operating deck.

The structure contains three flood-control openings (6.5-feet wide by 13-feet high), controlled by three service gates operated by cable drum type hoists. A single emergency gate, operated by a traveling crane, can be positioned in the gate passage upstream from any one of the service gates. The structure also contains two wet wells, each equipped with two, 5-foot by 7-foot conservation sluice gates and a 5-foot diameter steel pipe service conduit about 519 feet long, which runs parallel to the main conduit. Both service conduits are embedded in the concrete along the base of the main conduit. The four conservation sluices are controlled by hand-operated floor stands. The 16-foot diameter reinforced concrete conduit is approximately 445 feet long. The conduit portal unit is located at the downstream end of the conduit and contains two 8.75-feet wide by 21.5- feet long by 27.75-feet high valve rooms for each of the 5-foot diameter service conduits (Figure 1-4).

Figure 1-4 Lewisville Dam: Downstream View of Stilling Basin and Outlet Channel

The valve rooms contain valves and steel piping for diverting low flows either to the stilling basin, the penstocks for the non-federal hydropower facility, or Engineer Research and Development Center's Lewisville Aquatic Ecosystem Research Facility (LAERF). The stilling basin consists of a parabolically curved, reinforced concrete apron with the slab and training walls in the form of a reinforced concrete U-channel. The stilling basin is 180 feet long and is approximately 52-feet wide at the end sill. Wing walls at the downstream end of the stilling basin are 36 feet long.

In Figure 1-4, the non-federal hydropower plant can be seen on the left side of the photo. The service bridge consists of two, 120-foot long by 12-foot deep trusses supporting a 14-foot wide concrete bridge deck. The bridge is supported by the intake structure and by a reinforced concrete abutment incorporated into the embankment.

Figure 1-5 Lewisville Dam: View of Spillway Ogee Weir Looking Left

1.2.2.3 Spillway

The uncontrolled concrete ogee weir spillway is located near the left abutment (Figure 1-5). The structure consists of an approach channel; a 560-feet long concrete ogee weir with a crest elevation of 532 feet; two, 90-foot long concrete gravity sections (non-overflow); a paved apron; retaining walls; and, an unlined discharge channel. The reinforced concrete apron slab is about 209 feet long and 551-feet wide. The slab was built with a 10-foot deep turned-down wall at the end of the original apron slab. The reinforced concrete cantilever retaining walls are about 13-feet high and extend the length of the concrete apron. Twenty-eight-foot high wing walls are located at the downstream end of each retaining wall.

The spillway has no stilling basin and, because of high velocity discharges, was severely eroded at the downstream end of the sill during the uncontrolled releases of 1981 and 1982. Repairs were made to the spillway by extending the concrete apron 60 feet downstream with a 18 inch reinforced and anchored concrete slab and a 10-foot deep cutoff wall located at the downstream end of the new slab. Additionally, 24-inch riprap was placed at the downstream end of the new slab for a distance of approximately 30 feet after flows through the spillway occurred in 2007. Much of this riprap was redistributed during the uncontrolled releases that followed heavy rains in May 2015; repairs to restore the original riprap design occur as part of normal operations and maintenance activities.

1.2.2.4 Water Supply and Reservoir Operations

Conservation releases are made at the request of the City of Dallas, and are usually made through the low flow system. However, water supply releases can be made through the main conduit depending on the volume requested. During flood events, if the lake is below the top of flood pool (532 feet above msl), floodwater is retained until the river downstream has receded within its banks. Flood control releases from Lewisville Dam are coordinated with releases from seven other existing USACE dams for maximum flood protection in the Trinity River Basin. If the lake level rises above 532 feet, the floodwater flows over the uncontrolled spillway. Lewisville Lake has overtopped the spillway on seven occasions during the life of the project, the last of which occurred in May 2015.

1.2.2.5 Classification

Lewisville Dam currently has a Dam Safety Action Classification (DSAC) of "II," which is defined as "unsafe or potentially unsafe." Dams in this class are considered to have "failure initiation foreseen" in that, for confirmed and unconfirmed dam safety issues, failure could begin during normal operations or be initiated as the consequence of an event. While the probability, or likelihood, of failure occurring is remote, the risk of failure from one of these occurrences, prior to remediation, is too high. Risk is defined as a measure of the probability and severity of undesirable consequences or outcome. DSAC II dams may also have "very high incremental risks," the combination of life or economic consequences with likelihood of failure is high. The current DSAC was assigned based on the findings from the fiscal year (FY) 2005 Screening Portfolio Risk Analysis (SPRA) (see Section 1.3.2.1).

1.3 BACKGROUND

1.3.1 Lewisville Dam Safety

The USACE has determined that the Lewisville Dam requires structural improvements in order to safely meet authorized project purposes and to reduce risk to the public and property from dam safety issues posed by floods and seepage. The USACE has adopted a procedure for assessing risk at a dam project in terms of "tolerable risk." The procedure has been in use for the past 15 years or more by a number of federal and international dam management agencies.

The USACE prioritizes its dams for possible remediation through a process that determines risk. As part of the risk determination, tolerable risk guidelines have been developed. While economic risk and environmental risk are important considerations when assessing risk, life safety is paramount. Simply stated, it is intolerable if a dam has an annual probability of failure greater than 1/10,000; or if the assessed annualized life loss is greater than 0.001.

In 2005, the USACE determined through a screening-level risk assessment process that the Lewisville Dam posed unacceptable risk. Subsequently, the project received a risk classification that is described "urgent and compelling (unsafe)" and as "critically near failure," or "extremely high risk." It should be noted that the project received the "urgent and compelling (unsafe)" classification due to the "extremely high risk," and that the project is not believed to be "critically near failure." Failure is not believed to be imminent.

The Lewisville Lake facilities do not meet USACE tolerable risk guidelines; therefore remedial actions are necessary. Given the large population downstream of Lewisville Lake as well as safety issues at the dam, the Lewisville Lake facilities are among the USACE's highest priorities for risk reduction.

1.3.2 Dam Safety Studies

The USACE is performing a Lewisville Lake Dam Safety Modification Study (DSMS) following the six step framework of civil works planning guidance presented in ER 1105-2-100 *Planning Guidance Notebook* as adapted in the ER 1110-2-1156 Dam Safety Guidance for addressing dam safety issues:

1. Identify dam safety issues and opportunities.
2. Estimate baseline risk condition.
3. Formulate alternative risk management plans.
4. Evaluate alternative risk management plans.
5. Compare alternative risk management plans.
6. Select a risk management plan.

The DSMS lays the initial groundwork for the complementary alternative development process for NEPA. By identifying the specific safety issues and opportunities, the USACE is able to develop a focused purpose and need and associated proposed action. The following is an overview of the DSMS process for Lewisville Dam to date.

In 2005, the USACE developed and implemented a SPRA process for Dam Safety. The SPRA identified several "potential failure modes" (PFMs), or deficiencies based on current USACE criteria, at the Lewisville Lake Project that have the potential to contribute to dam failure. There are four risk-driving PFMs connected to seepage at the embankment and spillway instability. These PFMs range in annual probability of failure from 2.12E-6 to 2.40E-4. The combined likelihood of failure is 3.11E-4.

The most probable failure mode is erosion caused by seepage. There are three areas with high rates of seepage, two of which were identified as risk-driving PFMs. These are referred to at PFM 4A and PFM 4B. Erosion can occur underground if there are cavities, cracks, an unprotected exit, or other openings large enough so that soil particles can be washed into them and transported away by seeping water. When this type of underground erosion progresses and creates an open path for flow, it is called piping. The piping and erosion could rapidly progress and erode the dam leading to a complete breach. Water supply pipes downstream of the toe of the main embankment also may provide a potential seepage route. A pervious sand deposit overlying the bedrock and located beneath the embankment has provided a pathway through which clear seepage and undesirable uplift pressures have occurred at the toe of the embankment. The existing seepage control features are not considered sufficient to prevent initiation of a piping failure.

The risk-driving spillway instability PFMs are referred to as PFM 6 and PFM 7. The embankment downstream slope and foundation may not be stable under extreme loading conditions because of seepage uplift within the sand foundation overlain by the embankment. Extremely high water releases over the spillway cause erosion of the spillway channel downstream of the spillway concrete chute and could potentially shift the apron panels.

The spillway erodibility PFM may result in a loss of the spillway crest and partial loss of the reservoir. The other PFMs could result in a complete failure of the dam and loss of the reservoir. The project is a high hazard potential dam, which means there would be direct loss of life if failure occurred and that the economic consequences would be high.

The process also noted several non-risk-driving deficiencies. Three particularly noteworthy non-risk-driving PFMs are PFM 2, internal erosion of the embankment along the main conduit, PFM 8, shallow embankment slides from slow deformations accumulating over time, and PFM 10, erosion along utility lines that encroach on the embankment. The remainder of the identified PFMs are considered too remote in probability to be considered further.

The USACE continues to be responsive to deficiencies at the Lewisville Dam, including performing ongoing, as-needed slide repair and monitoring of the rate of seepage. It is assumed that the USACE monitoring, responsiveness, and emergency management of potential dam deficiencies would continue under the Future without Project Condition (FWPC), which would further reduce the likelihood of breach. Therefore, the combination of the low probability of failure with the high level of USACE attention makes catastrophic failure of the dam highly unlikely.

1.4 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

The purpose of the Proposed Action is to minimize the potential for dam failure by remediating the seepage deficiencies, spillway weir instability, and apron weakness at the Lewisville Dam for safe and effective functioning at authorized capacity, while reducing the risk to the downstream public to tolerable levels. The Proposed Action is needed to establish the Lewisville Dam as a safe facility that meets USACE risk reduction guidelines for existing dams and allows the project to provide the benefits for which it was authorized.

1.5 PROJECT AUTHORITY

1.5.1 Construction Authority

Lewisville Dam and Lake were initially authorized by the Rivers and Harbors Act of 1945 (Public Law 79-14) for improvements on the Trinity River and tributaries for navigation, flood control, and allied purposes. The project was for construction, and operations and maintenance (O&M) of Garza-Little Elm, since renamed Lewisville Lake. The Act authorized construction of a comprehensive program for the development of the water resources of the Trinity River basin, consisting of four multipurpose lakes (Lewisville, Benbrook, Grapevine, and Ray Roberts) and two floodway projects in Dallas and Fort Worth. The Water Supply Act of 1958, as amended, (43 USC § 390b) provides for storage and made it available for municipal and industrial water supply. The Rivers and Harbors Act of 1965 (Public Law 89-298, 79, Stat. 1091) modified the authorization provided by Rivers and Harbors Act of 1945 by requiring a reevaluation report for any navigation features. The Flood Control Act of 1970, Section 221 (42 USC §§ 1962d-5b) provides guidance with regard to payments for conservation storage.

1.5.2 Dam Safety Modification Authority

The ER 1110-2-1156 (final March 31, 2014) prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within the USACE. The purposes of the dam safety program are to protect life, property, and the environment by ensuring that all dams are designed, constructed, operated, and maintained as safely and effectively as is reasonably practicable. Prudent stewardship of available resources is essential to preserve the existing infrastructure. When unusual circumstances threaten the integrity of a structure and the safety of the public, the USACE has the authority to take expedient actions, require personnel to evaluate the threat, and design and construct a solution.

1.6 PRIOR STUDIES, REPORTS, AND EXISTING WATER PROJECTS

Relevant water resource studies, reports, and water projects (generally presented in chronological order) prepared by the USACE are described below.

1.6.1 Trinity River and Tributaries Environmental Impact Statement

The Trinity River and Tributaries Environmental Impact Statement (TREIS) was prepared by the USACE in the mid-1980s to address the increase in floodplain development that was occurring in the upper Trinity River basin. The TREIS focused on actions requiring USACE permits under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA) of 1972, as amended, with emphasis on addressing cumulative impacts of granting multiple permits. Two conclusions of this planning effort were that existing regional floodplain management policies were inadequate to maintain existing levels of flood protection within the region’s major urban areas and that additional, more stringent, floodplain management criterion were needed. In particular, this effort identified the system’s valley storage as a critical element requiring protection through the permitting process.

The Record of Decision (ROD) for the TREIS was signed in 1988. The TREIS ROD included hydrologic and hydraulic criteria for actions that require USACE permits, such as the 100-year flood and Standard Project Flood (SPF) water surface elevations along the Clear Fork, Elm Fork, and West Fork of the Trinity River, as well as tributaries that have drainage areas in excess of 100 square miles. The ROD also included criteria for projects in the floodplains of other tributaries of the Trinity River and established guidelines for mitigation of habitat losses resulting from projects in floodplain areas covered by the TREIS.

The criteria of the TREIS ROD apply only to permit applications for projects involving work in, or affecting, navigable waters of the United States (U.S.) under Section 10 of the CWA and discharges of dredged or fill material into waters of the U.S., including wetlands, under Section 404 of the CWA. The criteria do not apply to projects for which the USACE has no regulatory authority. The TREIS raised awareness that a large area of floodplain lands within the Upper Trinity River Basin could be developed outside the jurisdiction of the USACE and that, if developed following only Federal Emergency Management Agency (FEMA) requirements, increases in flooding frequency and extent would continue to occur in adjacent and downstream areas. Subsequently, local area governments (cities and counties) established the Corridor Development Certificate (CDC) process as a means to address those floodplain actions that were not regulated by the USACE.

1.6.2 Corridor Development Certificate

The CDC program is a joint effort of the North Central Texas Council of Governments (NCTCOG), the USACE, Fort Worth District, and member NCTCOG cities and counties with jurisdiction over the Trinity River floodplain. The purpose of the CDC process is to affirm local government authority for local floodplain management while establishing a common set of permit criteria and procedures for development within the Trinity River Corridor. Criteria used in the program mimic those developed by the USACE through the Regional Environmental Impact Statement (EIS) process described above. Member cities, counties, and the NCTCOG administer the CDC program with technical advice by the USACE. After a review by all other cities within the CDC program and an evaluation by the USACE, the proponent decides whether to allow a proposed floodplain alteration. CDC program members include the cities of Arlington, Carrollton, Coppell, Dallas, Farmers Branch, Fort Worth, Grand Prairie, Irving, and Lewisville as well as Dallas and Tarrant counties

1.6.3 Upper Trinity River Basin, Trinity River, Texas -- Reconnaissance Report

The TREIS and CDC heightened regional awareness relative to flood hazards. The process generated broad recognition that flood hazards could (and would) deteriorate in the future, absent regional strategies to protect both conveyance and valley storage. A byproduct of this effort, however, was a general understanding that flood hazards had already increased during the years subsequent to construction of the floodway system, and that the level of protection in the regional system had deteriorated. While adherence to the CDC and the mitigation outlined in the ROD could stabilize the existing situation, following these guidelines would not restore the protection that had been lost in the decades between the 1950s and the 1980s. To address this aspect of flood hazards, 13 sponsors petitioned Congress for a new study authority. The U.S. Senate Committee on Environment and Public Works Resolution, dated April 22, 1988, directed the USACE to "… provide improvements in the interest of flood protection, environmental enhancement, water quality, recreation, and other allied purposes in the Upper Trinity River Basin." The Reconnaissance Report conducted under this authority was completed in March 1990.

Results of these analyses indicated that all of the existing USACE projects were designed using criteria applicable to the time of their construction. This study, however, affirmed that urban development had exceeded previously projected expectations, causing increased runoff and peak discharges. Based upon 13 structural alternatives investigated and the social and environmental impacts of each of the alternatives, eleven viable flood control projects were identified. Other water and land resource problems and needs identified during the study included water quality improvement, environmental and fish and wildlife enhancement, recreational development, and the need for preservation of open space within the Dallas-Fort Worth Metroplex area.

1.6.4 Upper Trinity River Basin -- Final Programmatic Environmental Impact Statement

Due to the large number and wide variety of projects identified as potentially feasible throughout the Upper Trinity basin, the USACE and local sponsors concluded that a programmatic assessment would be needed to fully comply with NEPA. This programmatic EIS, dated June 2000, focuses on various potential USACE projects that were being investigated at the time. Reasonably foreseeable projects being pursued by other entities within the Study Area were also identified and potential direct and cumulative impacts resulting from implementation of the entire suite of projects on the human and natural environment were assessed.

The document provides a general description of the environmental setting of the Upper Trinity River Basin. In addition, the document also analyzes recreation use trends and makes projections for future recreational needs in the Upper Trinity River basin. Most importantly, this Programmatic EIS set the stage for focused evaluation of discreet segments of the river for flood damage reduction, ecosystem restoration, and recreation purposes.

1.6.5 Lewisville Lake Master Plan

The Lewisville Lake Master Plan describes how all project lands, waters, and other resources will be enhanced, developed, and managed in the public interest. The Master Plan examines those features that contribute to the potential of the project to support recreation development and use. The Master Plan also provides the authority for potential implementation of any proposed features or activities. The Lewisville Lake Master Plan is subject to periodic review and update by the USACE, with the next update planned for 2017.

1.6.6 Lewisville Lake Programmatic Environmental Assessment

The Lewisville Lake Programmatic EA (1999) discussed the environmental impacts of more than 300 foreseeable individual development activities being proposed by 18 public and private entities on federal lands around Lewisville Lake over a 10-year time period. These activities were assessed to properly evaluate the cumulative impacts of all of these developments. Activities with a cumulative result of no significant impact were included in the supplementation of the Lewisville Lake Master Plan.

1.7 PUBLIC AND AGENCY COORDINATION

1.7.1 Agency Coordination

As part of the NEPA process, the USACE has and continues to reach out to agencies, organizations, and the public in an attempt to solicit input on the Proposed Action. The following paragraphs describe how the USACE has coordinated with government agencies and involved the public. Agency coordination documentation, with the exception of the U.S. Fish and Wildlife Service (USFWS) Coordination Act Report process, is in Appendix B.

The USACE and USFWS have been coordinating on the Lewisville Dam safety modifications for over 7 years. As part of this analysis and as required under the Fish and Wildlife Coordination Act, the USFWS has prepared a series of Planning Aid Letters (PAL) and a Planning Aid Report (PAR) to assess the baseline habitat conditions and predict future habitat conditions with and without the Proposed Action. The first PAR was prepared in 2011, the second in 2014 with updated site visit data, and the final PAR in 2016 (Appendix C). The USFWS will review this EA and issue a Coordination Act Report with their final findings. The findings of the USFWS in the Coordination Act Report will be incorporated into the USACE's decision document.

On June 23, 2016, the USACE submitted an Architectural Cultural Resource Analysis to the Texas Historical Commission (THC). The analysis described the proposed action, and evaluated the resources within the Project Area for eligibility for listing to the National Register of Historic Places (NRHP). The THC concurred with the USACE's findings on July 7, 2016. Record of this concurrence is in Appendix B. On March 22, 2016, the USACE submitted an analysis of potential impacts to archeological impacts from the implementation of the Proposed Action to the THC. The THC's findings and final determination of the analysis will be incorporated into the USACE's decision document.

1.7.2 Public Involvement

1.7.2.1 Major Stakeholders

Since the preliminary planning efforts associated with the Lewisville DSMS, the USACE has been engaging with major stakeholders with direct interests in the project. Stakeholders involved in regular meetings have included the directly affected municipalities, regional utility providers, and the two main land users (LAERF and the Lewisville Lake Environmental Learning Area [LLELA] organizations) of the Project Area. The cities of Denton and Dallas are dependent on Lewisville Lake as a major water supply source. The City of Lewisville surrounds the Project Area and would have the greatest potential for direct impacts associated with the project. Coordination regarding utilities has included the municipalities, as well as Verizon (fiber optic overhead lines and telephone lines), CoServe Electric, Texas New Mexico Power, and Garland Power & Light.

<u>Lewisville Aquatic Ecosystem Research Facility</u>

The United States Army Engineer Research and Development Center operates LAERF immediately downstream of the Lewisville Dam on USACE project property. An experimental pond facility developed by the USACE Aquatic Plan Control Research Program, LAERF supports studies on biology, ecology, and management of aquatic and wetland plants. LAERF provides an intermediate-scale research environment to bridge the gap between small-scale laboratory studies and large-scale field tests. LAERF is supplied with water directly from Lewisville Lake. The research facility operates 53 earthen ponds that are utilized as testing sites prior to large-scale field applications. Additionally, 18 flow-through raceways are utilized for small-scale studies on effects of flow and/or constituent loading on aquatic and wetland biota or ecosystem processes. All ponds and raceways can be filled and drained independently, allowing for control of varied hydrologic regimes. Most are equipped with adjustable standpipes to provide constant water levels, if desired.

<u>Lewisville Lake Environmental Learning Area</u>

LLELA was created in the early 1990s by a consortium of local, state, and national government agencies, who have obtained a 25-year management lease from the USACE. Currently, the LLELA consortium is comprised of the University of North Texas, Texas A&M University, the City of Lewisville, and the Lewisville Independent School District. The principal goals of management at LLELA are to preserve and protect native biodiversity and to restore degraded ecosystems, communities, and native biodiversity while providing compatible educational and scientific use of LLELA lands.

Since 2004, LLELA staff and volunteers have conducted plant rescues that involved collecting both seed and rootstock from prairie remnants in Denton, Dallas, Tarrant, Collin, Rockwall, Wise, Cooke, Hunt, Ellis and McLennan counties and replanting those remnants on the project lands in the Study Area. LLELA is also tasked by the USACE to utilize mitigation funds from impacts that could not be avoided or minimized *in situ* associated with land use proposals affecting federal land and water resources at Lewisville Lake.

Mitigation efforts include:

- Wetland restoration in Bittern Marsh located downstream of the Lewisville Dam.
- Forest habitat improvements in the upper reaches of Stewart Creek began in 2007; including removal of large expanses of invasive Chinese privet (*Ligustrum sinensis*). Removal efforts using physical and chemical methods have continued since that time. In areas where the Chinese privet was removed, native species have been planted.

- Efforts to utilize short-term intensive rotational grazing practices with bison to restore natural ecosystem functions were ongoing in the Project Area downstream of the dam but have recently been stopped.

From September 30, 2013 to September 30, 2014, over 12,300 schoolchildren, Scouts, college students, and other groups participated in field studies and tours at LLELA. As was noted in the 2013 annual report, most groups who visit LLELA return the following year. In 2014, nearly every group that visited LLELA in 2013 returned, and new groups also visited the facilities. LLELA supports home school natural science classes and preschool activities, and many more LLELA-sponsored public events on the weekends, increasing visitation in the Project Area downstream of the dam.

1.7.2.2 Public Outreach

Scoping is a public process designed to determine issues and alternatives to be addressed in a NEPA document. The scoping process for a Draft EIS began on July 31, 2013, with the publication of the Notice of Intent (NOI) in the Federal Register. The NOI provided formal notification to the public and agencies that a Draft EIS would be prepared for the Lewisville Dam Safety Modification Project.

In August 2013, an initial public meeting was held in Lewisville. This meeting was to brief the public on the deficiencies identified for the Lewisville Dam facilities and to report on the ongoing investigations and activities being conducted at the facility, to outline the process moving forward, and to provide an opportunity to submit questions and general comments on the proposed Lewisville Dam Safety Modification Project.

A second public informational meeting was held November 16, 2015 in Lewisville. The USACE provided an update on the status of dam safety investigations and the preliminary risk reduction measures under consideration in formulating remediation alternatives. There was also a discussion of the environmental review process and the environmental studies being prepared in support of the proposed Lewisville Dam Safety Modification Project. Again, the public was given an opportunity during the meetings to provide input regarding issues of concern and to ask questions of subject matter experts.

The USACE maintains mailing and e-mail distribution lists to communicate and coordinate with various government entities and officials, tribal groups, water users, media, and other stakeholders. Meetings with LLELA continue as needed, but at a minimum frequency of quarterly as project development continues.

In the course of refining the Proposed Action being considered, project requirements resulted in a substantially smaller project footprint than was initially under evaluation. Furthermore, avoidance and minimization measures were identified and integrated into the Proposed Action that also substantially reduced the potential for environmental impact. As a result of these refinements, the USACE made the decision to retract the initial NOI, and move forward with the analysis as an EA instead of an EIS. As part of the decision to move forward with an EA, the USACE consulted internally with senior team members, as well as externally with the USFWS and stakeholders including the LLELA organizations. The NOI retraction was published in the Federal Register on July 12, 2016.

This EA is being made publicly available as of September 16, 2016. Interested parties may access this EA via the USACE website or in hard copy at the Lewisville Public Library, Valley Ranch Library, North Oak Cliff Branch Library, Coppell Public Library, J. Erik Jonsson Central Library, Dallas West Branch Library, Farmers Branch Manske Library, or the Oak Lawn Branch Library. The USACE is also hosting an open house public meeting to present the findings of this EA and solicit comments from the public in Lewisville on September 27, 2016. A Notice of Availability (NOA) was mailed on September 14, 2016 to interested and potentially affected parties. The NOA includes the locations of publicly available copies of the EA, directions on how to comment on the EA, and information regarding the time and location of the public meeting.

Materials associated with public notice and coordination are included in Appendix A.

1.7.3 Key Issues

Based on the public meetings and interagency coordination held to date, the following issues have been identified as key concerns and questions relevant to the scope of the EA:

- The urgency of the need to address public safety.
- The construction period and long-term effects on lake levels, flood reduction, and irrigation water storage.
- The construction and long-term effects on water quality, fisheries, and natural resources.
- The impacts on lake-based recreation, recreation opportunities, and the local recreation-based economy.
- The borrow sources and location under consideration.
- Impacts on traffic, noise, and air quality during construction.

1.8 USACE ENVIRONMENTAL OPERATING PRINCIPLES

The USACE has developed core "Environmental Operating Principles" that guide the USACE in its planning, coordination, and project implementation efforts. A description of these core Environmental Operating Principles follows:

Environmental Sustainability. The USACE will strive to achieve environmental sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.

Understand Interdependence. The USACE recognizes the interdependence of life and the physical environment and will proactively consider environmental consequences of USACE programs and act accordingly in all appropriate circumstances.

Seek Balance. The USACE will seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.

Accept Responsibility. The USACE will continue to accept corporate responsibility and accountability under the law for activities and decisions under USACE control that impact human health and welfare and the continued viability of natural systems.

Recognize the Big Picture. The USACE will seek ways and means to assess and mitigate cumulative impacts to the environment. The USACE will do this by applying systems approaches to the full life cycle of USACE processes and work.

Build Awareness. The USACE will build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of proposed USACE actions.

Listen and Learn. The USACE will respect the views of individuals and groups interested in USACE activities, listen to them actively, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

The USACE strives to incorporate these principles into their projects when applicable. In doing so, the USACE and project stakeholders can work together to ensure proposed projects maximize the "public good" and minimize recognized negative impacts. The USACE has incorporated these Environmental Operating Principles into this NEPA document.

1.9 IMPACT ASSESSMENT CRITERIA

The USACE has identified a broad spectrum of general and project-specific criteria with which to assess the potential effects stemming from implementation of a proposed action. This analysis was completed incrementally to address the impacts of specific features associated with each alternative. These criteria, organized into four groups, serve as the basis for the impact analysis. Each criteria group is broadly defined in the following paragraphs. The criteria groups are as follows:

- Institutional Criteria
- Public Criteria
- Engineering Criteria
- Scientific Criteria

1.9.1 Institutional Criteria

Institutional criteria include those criteria required by NEPA for federal agencies to take into consideration when assessing the potential environmental consequences of the Proposed Action in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. Examples include the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC § 470), the Endangered Species Act (ESA) of 1973, as amended (16 USC §§ 1531 *et seq.*), and the CWA of 1972, as amended (33 USC §§ 1251 *et seq.*).

1.9.2 Public Criteria

Public criteria include those criteria deemed important by the public. These criteria include things such as flood risk management, visual/aesthetic corridors, and recreational opportunities. As part of the public involvement process, the USACE solicited input from the public. Examples of areas identified by the public as being of concern and worthy of consideration in this EA include recreation and water supply.

1.9.3 Engineering Criteria

Engineering criteria include those criteria developed by the USACE that demonstrate consistency with the technical aspects of the USACE mission, most namely, dam safety. These criteria assist in determining the "technical soundness" of the project. Example engineering criteria include embankment stability.

1.9.4 Scientific Criteria

Scientific criteria include those criteria that represent the recognized scientific or environmental qualities specific to the Study Area that assist in determining the "environmental acceptability" of the project. These include criteria that are important to local and state interests, for example, protection of state-listed threatened or endangered species of fish, wildlife, and plants; and that a project must obtain a water quality certification from the State of Texas prior to the start of construction, as required by the CWA.

1.10 ORGANIZATION OF THIS EA

Chapter 1 describes the Study Area, background, the purpose of and need for the project, the project authority, USACE Environmental Operating Principles, Agency Coordination and Public Involvement actions, and presents the impact analysis criteria.

Chapter 2 presents the Proposed Action, the alternative development process, the alternatives to be analyzed within this EA, and the alternatives considered but eliminated.

Chapter 3 contains a description of existing conditions for each of the environmental resource areas analyzed in the EA. This chapter represents the baseline from which all resource impact analyses are derived.

Chapter 4 presents an analysis of anticipated environmental resource conditions under the FWPC (the No Action Alternative). The FWPC summarizes the anticipated future cumulative conditions without implementation of the Proposed Action. Chapter 4 also presents the impact analysis for the implementation of the Proposed Action. Construction, operation, and cumulative impacts are presented in Chapter 4.

Chapter 5 identifies any special conservation measures recommended to be employed in the course of project implementation.

Chapter 6 contains additional analysis required by NEPA, to include an analysis of irreversible and irretrievable commitment of resources, short-term uses versus long-term productivity, and climate change.

Chapters 7, 8, and 9 contain the references, persons and agencies contacted, and list of preparers, respectively. The appendices contain additional information including public comments, agency coordination/correspondence letters, the NOI and subsequent retraction for the EIS, and technical analysis that supports the resource area discussions presented in Chapters 3, 4, and 5.

CHAPTER 2
PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

2.1.1 Overview

The Proposed Action presented in this EA consists of implementing proposed safety modifications to the Lewisville Dam in Lewisville, Texas. The proposed improvements would aim to address the risk-critical PFMs identified during the PFM analysis.

Many investigations, studies, workshops, technical meetings, and various discussions with engineers, planners, contractors, cooperating agencies, stakeholders, and the public have taken place. The investigations and studies began in the early to mid-2000s, and are nearly complete today. The USACE held their first meeting with the public in 2013 once they had a good understanding of the risk and deficiencies associated with the dam. This comprehensive effort has included the development and evaluation of an array of specific remediation measures, which have been formulated into the action alternatives that are described and evaluated in this EA.

Implementing the Proposed Action involves altering the Lewisville Dam and spillway, constructing new structures and facilities, and performing numerous associated support actions over an anticipated multiyear construction period. This EA evaluates the potential environmental impacts associated with the Proposed Action.

This EA also represents an important step in the process by allowing public and agency review and comment of the evaluation of potential environmental impacts associated with the identified action alternatives. The USACE will consider all comments and input received from public and agency reviews and will select a preferred alternative that will be included in the EA and decision notice (either a Finding of No Significant Impact or a NOI to Prepare an EIS). The EA and decision document will become part of the Dam Safety Modification Report for the Lewisville Lake Dam Safety Modification Project.

The following sections of this chapter documents the alternative development process, describes the action alternatives, discusses alternatives considered and/or evaluated in this EA, and presents the anticipated general construction schedules envisioned for the alternatives selected for detailed evaluation in the EA.

2.2 ACTION ALTERNATIVE DEVELOPMENT

2.2.1 Development of the Proposed Action

The Proposed Action was developed in the course of the six-step framework of civil works planning guidance described in Section 1.3.2. This section discusses development of potential project and feature alternatives as well as the process that developed the proposed features of the Proposed Action presented in this EA.

The first phase of the process began in early 2009 with the main purpose of identifying and describing the array of potential remediation measures (structural and nonstructural) that could be implemented to address the identified risk-driving PFMs and reduce the risk of dam failure. The objectives of the initial efforts included: (a) developing an array of potential remediation measures that would reduce the risk associated with the specific seepage, structural, and hydrologic deficiencies in the Lewisville Dam and spillway that had been identified and described in previous recent studies; (b) performing an initial feasibility screening of the remediation measures; and (c) beginning to formulate action alternatives from various combinations of the measures.

The second phase of the alternative development reviewed the PFM remediation measures in light of potential impact, risk reduction, and cost of implementation to establish a specific group of measures that would meet the objectives and requirements of ER 1110-2-1156.

2.2.2 PFM Remediation Measures

The USACE has identified multiple approaches to addressing each risk-driving PFM. Each measure has unique risk reduction benefits and costs associated with it. The measures represent the basis for the action alternative development. The PFM numbering reflects the original ordinal evaluation of PFMs in early studies.

2.2.2.1 PFM 4: Embankment Seepage

PFM 4 is a particular concern in two different areas of the dam (“Seepage Area 1” and “Seepage Area 2”). Because geologic and seepage characteristics differ in the two areas, remediation measures are specific to each area.

<u>Remediation Measures Considered for PFM 4A (Seepage Area 1)</u>

Evaluated remediation measures for PFM 4A at Seepage Area 1 include a downstream inverted filter berm, erosion interceptor, grouting of sand layers, lowering of the lake conservation pool level, construction of an upstream blanket, a collection trench, cutoff walls, replacement of the embankment at Seepage Area 1, and relief wells with associated collection systems. Of these measures, only the downstream inverted filter berm, collection trench, and cutoff walls are being carried forward for analysis. The remaining measures were not found to provide sufficient reduction of risk to warrant further consideration.

Downstream Inverted Filter Berm

The measure would consist of a sand layer placed on the existing clay blanket. The sand layer would be covered with a coarse material. A final layer would be added to increase the weight of the berm and to support the establishment of vegetation. The inverted filter would intercept any flows or blowouts through the clay blanket. The weight of the berm would address the uplift concerns and lengthen the seepage path thereby lowering the gradient at the exit. The berm would be constructed by removing the topsoil and placing 18 to 24 inches of sand, then a minimum of 12 inches of a coarse material. For operation and maintenance convenience, the coarse material could be covered with a minimum of 12 inches of topsoil and vegetated. The berm is anticipated to fit between the downstream toe of the embankment and the access road that is downstream of embankment.

The design would be based on seepage analysis or available seepage information for uplift. The foundation of the berm would need to be firm for fill placement. The measure would require suitable borrow site and/or filter materials. Relocation of overhead utilities and waterlines would be completed prior to berm installation; berm extents may be required prior to waterline relocation. Construction of the filter berm would take less than 1 year.

The filter berm would improve the stability of the impervious clay blanket and lengthen the seepage path (and thus reduce the risk of blowout). Analysis suggests this measure would be most effective if paired with a collection trench.

Collection Trench

This measure would include installing a trench into the sand strata. The drain material would be designed to also serve as a filter material. A drainpipe would be installed in the trench to convey collected seepage to an outlet. This measure could be combined with the downstream inverted filter berm measure. This measure would capture embankment seepage and safely convey to outfall location. A dewatering system may be required during construction. Construction of the collection trench would be less than 1 year.

The collection trench would capture and convey seepage flow away from the dam and thus improving embankment stability. Seepage flow rates could be monitored and any substantial changes could be rapidly identified and addressed.

Cutoff Wall

This measure is a cutoff wall that would be constructed upstream of the centerline of the dam, preferably in line with the existing inspection trench. The purpose of the wall is to create a positive cutoff through the continuous sand strata. The wall would be constructed by excavating to depth and backfilling with an impervious material (e.g., concrete). The depth of the wall should extend through the sand strata and into the underlying shale material (approximately 75 to 90 feet). The width of the wall could be a function of the equipment and impervious material utilized (estimate between 12 and 24 inches). The length of the cutoff wall could vary from a minimum of approximately 900 feet to a maximum of approximately 1,500 feet.

This measure is considered a standalone measure that would not impact existing downstream features. The preliminary location of the cutoff wall could be on upstream side along the inspection trench; however, there are multiple viable locations for further considerations. A cutoff wall would be constructed with an impervious material from conservation pool level to either bottom of the inspection trench or embedded into the impervious rock. The wall should have enough length that would not allow seepage flow around the wall. A wall, if constructed from upstream slope, may require lowering of pool level. Construction of the wall would take less than 1 year.

The cutoff wall measure would effectively eliminate seepage under the dam and thus reduce water pressure on the foundation of the embankment. The cutoff wall would preclude backward erosion and piping.

Remediation Measures Considered for PFM 4B (Seepage Area 2)

Evaluated remediation measures for PFM 4B at Seepage Area 2 include a collection trench, cutoff wall, downstream inverted filter berm, relief wells, and replacement of the embankment at Seepage Area 2. All of these measures with the exception of embankment replacement are being carried forward for analysis. As described in Section 2.3.3.5, embankment replacement was found to be too expensive for the resulting reduction of risk to warrant further consideration.

Collection Trench

The collection trench would be the same as that described under PFM 4A. As with PFM 4A, the collection trench for PFM 4B could be combined with a downstream filter berm.

Cutoff Wall

The cutoff wall would be the same as that described under PFM 4A. The length of the cutoff wall could vary from a minimum of approximately 1,000 feet to a maximum of approximately 1,800 feet. This measure is considered a standalone measure that would not impact existing downstream features.

Downstream Inverted Filter Berm

The downstream inverted filter berm would be the same as that described under PFM 4A. The berm is anticipated to fit between the downstream toe of the embankment and the access road that is downstream of embankment.

Relief Wells

The measure would include the installation of relief wells and a collection system along the downstream side of the embankment. The system would most likely need to include more than one row of relief wells to accomplish the desired results. Due to the site geology, this measure would be less effective and efficient than other measures. If O&M is not kept current, it could create non-functioning wells or create an unfiltered exit.

Relief wells have the advantage of capturing and conveying seepage flow away from the embankment, thus increasing the stability of the impervious clay blanket. However, the relief wells may have a lifespan of only 25 years and would likely need replacement at that time.

2.2.2.2 PFM 6: Spillway Stability

Evaluated remediation measures for PFM 6 include the addition of foundation drains, anchor stability, construction of an auxiliary spillway, buttress stability, remove and replace spillway, shear key, keying monoliths together, installing an upstream apron, and widening the existing spillway. Of these, the anchor stability, buttress overlay stability, shear key, and upstream apron measures are being carried forward for analysis. The remaining measures are not carried forward as they do not offer sufficient risk reduction to warrant further consideration.

Anchor Stability

This measure proposes to install post-tensioned anchors through the concrete spillway into the foundation to prevent sliding failure of the weir monoliths. Spillway anchors would be designed to satisfy sliding stability for all loading conditions. An estimated four anchors per monolith are anticipated for the desired stability improvement. Construction would take approximately 1 year.

Anchor stability measures would stabilize the spillway weir, countering uplift and sliding. The measure could be implemented with other spillway improvements, or as a stand-alone measure.

Buttress Overlay Stability

This measure proposes to install a concrete overlay on the ogee (i.e., s-shaped) spillway. The additional weight of added concrete materials would help stabilize the spillway against sliding for all design load conditions. Construction would take approximately 1 year.

Buttress stability measures would stabilize the spillway weir, countering sliding. The measure would be implemented as a stand-alone measure.

Shear Key

This measure would install a concrete shear key at the toe of the spillway to engage a passive wedge with increased sliding resistance (functioning similar to a doorstop). The shear key would be designed so that minimum sliding safety factors would be met for all loading conditions. Discreet piles with small gaps between with cap sill could be used in place of a single wedge to avoid trapping seepage uplift pressures under the weir. Construction would take approximately 1 year.

The shear key measure could be implemented as a stand-alone measure for PFM 6, and could be designed to also address PFM 7.

Upstream Apron

This measure would install a concrete or geo-membrane apron upstream of the spillway to prevent uplift pressure migrating along weir foundation. Reduced uplift pressure would help stabilize the monoliths. This measure could offer some redundancy but does not substantially reduce risk on its own. It may be combined with the buttress or anchor stability measures. Construction would take approximately 1 year, if water does not flood the construction area.

2.2.2.3 PFM 7: Spillway Apron

Evaluated remediation measures for PFM 7 include the addition of an end sill and baffle blocks, anchoring the existing apron, overlay the spillway apron, and removing and replacing the apron. Of these, all except the end sill and baffle blocks measures are carried forward. The end sill and baffle block measure does not offer sufficient risk reduction to warrant further consideration.

Anchor Existing Apron Slabs

This measure proposes to **s**tabilize spillway apron slabs from uplift/plucking and sliding by adding additional anchors into the foundation. Additional grinding to remove offsets to flow would be required. Anchors would have to be designed to accommodate potential for further heave of foundation materials; the possibility for future heave could be minimized by sealing existing joints and drain holes. Construction would take approximately 1 year.

This measure would stabilize the existing apron. This measure would be implemented to only those slabs that are currently displaced, or to all slabs making up the existing apron. This measure would be most effective when implemented with supporting measures.

Overlay Spillway Apron

Under this measure, the USACE would install a 12- to 18-inch thick overlay on top of the existing damaged spillway apron. This measure would fix all apron slabs. Construction joints in the overlay would be keyed to prevent differential movements, protected with waterstops to prevent water intrusion, and staggered from existing joints. New anchors would be installed from the overlay through existing apron slabs and into the foundation. Construction would take approximately 2 to 3 years.

The apron overlay would create an even apron surface. The additional weight of the overlay would also decrease uplift concerns.

Remove and Replace Apron

Under this measure, the USACE would remove and replace the existing damaged spillway apron. This measure would fix all of the apron slabs. Over excavation and replacement of 6 to 8 feet of expansive materials may be required. New construction joints would be keyed to prevent differential movements and protected with waterstops to prevent water intrusion. Construction would take approximately 2 to 3 years.

2.2.2.4 PFM 2: Outlet Conduit Erosion

PFM 2 refers to the risk associated with internal erosion of the Lewisville Dam embankment along the outlet conduit. There are no indications of any near-term concerns at the conduit, so the probability is remote. However, the consequences would be high if failure were to occur. The risk associated with this PFM is relatively low, but measures to address it are included to take advantage of construction and design efficiencies.

This measure would surround the existing conduit with a fine horizontal filter and two outlets on each side. The filter would extend approximately 50 feet upstream of the conduit. The fine filter would extend downstream along both sides of the basin wall and convert to a two-stage filter along the weep holes in the basin walls. The two-stage filter would allow the weep holes to discharge any collected seepage and prevent the piping of the fine filter through the weep holes.

2.2.2.5 PFM 8: Slope Stability Improvement

PFM 8 refers to the instability of the upstream embankment slope contributing to a risk of slope failure that would lower the top of dam at the site of the slide. The probability associated with this PFM is remote, but measures to address it are included to take advantage of construction and design efficiencies, since consequences would be moderate to high.

This measure would consist of installing an upstream embankment berm on parts of the embankment. The crest modification would occur along the same embankment.

The embankment berm would be constructed to an elevation of 537.0 with a 15-foot top width and 4:1 upstream slope. The embankment berm would have rock riprap protection on the upstream slope to protect against wave erosion. The fill for the embankment berm would come from the proposed borrow locations. The crest modification would include removing the existing pavement and removal of approximately 6 feet of the embankment. The material from the embankment would be lime treated and replaced. The crest would be sloped to the downstream side and a geomembrane added prior to repaving the crest road.

2.2.2.6 PFM 10: Failure of Waterlines

PFM 10 refers to potential instability that would be caused if the underground waterline that penetrates the dam embankment and that traverses the toe were to rupture. If the waterline were to rupture, water would saturate the embankment, and initiate and/or exacerbate progressive seepage and/or stability failure modes.

This measure would consist of relocating the waterline away from the embankment. This measure would be implemented regardless of the implementation of the Proposed Action. If the Proposed Action were authorized, the PFM 10 measures would be contracted through the USACE. Because the completion of PFM 10 would be managed by the USACE (if the Proposed Action is implemented), but would be completed as a separate action (if the Proposed Action is not implemented), the measures associated with PFM are considered to be both part of the FWPC and as a connected action to the Proposed Action.

2.3 ALTERNATIVES

2.3.1 PFM Combinations

In accordance with the guidelines in ER 1110-2-1156, the comprehensive alternative formulation process summarized in the previous section resulted in the identification of multiple potential remediation measures for each PFM. Each combination of remediation measures addresses all risk-driving PFMs, but uses different groups of measures to do so. Eight combinations were developed for evaluation by the USACE Dam Safety team. These combinations are listed here and in Table 2-1:

1. Combination 1: PFM 4A and 4B would be addressed through upstream cutoff walls; PFM 6 would be addressed through the buttress with piers and upstream geomembrane cutoff; PFM 7 would be addressed through the removal and replacement of the apron slabs.
2. Combination 2: PFM 4A would be addressed through an upstream cutoff wall; PFM 4B would be addressed through the collection trench, PFM 6 would be addressed through the buttress with piers and upstream geomembrane cutoff; PFM 7 would be addressed through the removal and replacement of the apron slabs.
3. Combination 3: PFM 4A would be addressed with a downstream inverted filter berm with collection trench; PFM 4B would be addressed through the collection trench, PFM 6 would be addressed through the buttress with piers and upstream geomembrane cutoff; PFM 7 would be addressed through the removal and replacement of the apron slabs.
4. Combination 4: PFM 4A would be addressed with a downstream inverted filter berm with collection trench; PFM 4B would be addressed through the collection trench, PFM 6 would be addressed through the post-tensioned anchors with upstream geomembrane cutoff; PFM 7 would be addressed through the overlay of the existing apron.
5. Combination 5: PFM 4A would be addressed with a downstream inverted filter berm with collection trench; PFM 4B would be addressed through the downstream inverted filter berm; PFM 6 would be addressed through the buttress with piers and upstream geomembrane cutoff; PFM 7 would be addressed through the removal and replacement of the apron slabs.
6. Combination 6: PFM 4A would be addressed with a downstream inverted filter berm with collection trench; PFM 4B would be addressed through the downstream inverted filter berm; PFM 6 would be addressed through the post-tensioned anchors with upstream geomembrane cutoff; PFM 7 would be addressed through the overlay of the existing apron.
7. Combination 7: PFM 4A would be addressed with a downstream inverted filter berm with collection trench; PFM 4B would be addressed through relief wells; PFM 6 would be addressed through the buttress with piers and upstream geomembrane cutoff; PFM 7 would be addressed through the overlay of the existing apron.
8. Combination 8: PFM 4A would be addressed with a downstream inverted filter berm with collection trench; PFM 4B would be addressed through relief wells; PFM 6 would be addressed through the buttress with piers and upstream geomembrane cutoff; PFM 7 would be addressed through the minimal apron repairs with lateral drainage.

Table 2-1. Summary of PFM Remediation Measure Combinations

PFM	Measure	FWPC	Combination							
			1	2	3	4	5	6	7	8
4A	Upstream Cutoff Wall	-	X	X	-	-	-	-	-	-
	Downstream Inverted Filter Berm with Collection Trench	-	-	-	X	X	X	X	X	X
4B	Upstream Cutoff Wall	-	X	-	-	-	-	-	-	-
	Downstream Inverted Filter Berm	-	-	-	-	-	X	X	-	-
	Collection Trench	-	-	X	X	X	-	-	-	-
	Relief Wells	-	-	-	-	-	-	-	X	X
6	Post-Tensioned Anchors with Upstream Geomembrane Cutoff	-	-	-	-	X	-	X	-	-
	Buttress with Piers and Upstream Geomembrane Cutoff	-	X	X	X	-	X	-	X	X
7	Remove and Replace Apron Slabs	-	X	X	X	-	X	-	-	-
	Overlay	-	-	-	-	X	-	X	X	-
	Minimal apron repairs with lateral drainage	-	-	-	-	-	-	-	-	X
2	Conduit Filter	-	O	O	O	O	O	O	O	O
8	Slope Stability Improvements	-	O	O	O	O	O	O	O	O
10	Waterline Relocation	X	X	X	X	X	X	X	X	X

Notes: X= included in combination; - = not included in combination; O = included as an option for incorporation review.

2.3.2 Proposed Action Determination

On March 2-3, 2016, the full USACE project team evaluated each combination in terms of risk reduction, potential environmental impact, and cost of implementation. In the course of the evaluation, it was determined that each combination had a very similar footprint and thus similar impact analysis. With the decision to evaluate to most impactful borrow site usage, the similarity in footprint was such that differences among combinations would be negligible. Thus, while the engineering of each combination may be very different, comparison of environmental impact from each PFM was determined not to be a meaningful analysis that would aid in the USACE or the public in the decision-making process.

The evaluation of PFM measures was then focused to risk reduction and cost of implementation. Based on these elements, the project team determined that the Proposed Action would be comprised of the following dam safety measures:

- PFM 4A: Downstream Inverted Filter Berm with Collection Trench
- PFM 4B: Downstream Inverted Filter Berm with Collection Trench
- PFM 6: Post-Tensioned Anchors with Upstream Geomembrane Cutoff
- PFM 7: Overlay
- PFM 2: Conduit Filter
- PFM 8: Slope Stability Improvements
- PFM 10: Waterline Relocation

These features are as described in Section 2.2.2 with the refinements described below. The Proposed Action would also include project features required for the implementation of all PFMs (access roads and vegetation clearing), borrow sites, and habitat measures as described below. The proposed features would be designed and implemented to avoid affecting lake operations.

2.3.2.1 PFM 4A

The proposed treatments at PFM 4A include the construction of a trapezoidal collection trench and an inverted filter berm at Seepage Area 1. The collection trench would be approximately 400 feet long, and would be near the toe of the inverted filter berm that is included in this measure. The collection trench would intersect the sand strata along its length. The collection trench would outflow into a weir box and then flow on the surface until it reaches the stream southeast of the seepage area. The inverted filter berm would consist of a fine and course filter section at the base of the berm. The remainder of the berm would consist of fill obtained from the borrow sites. The berm length would be around 400 feet and the width extends approximately 160 feet downstream. The berm would add stability to the embankment and would cover existing cracks and holes. At completion, the berm would be seeded with native grass seeds, and future maintenance would include regular mowing of vegetation.

Dewatering would be required for this construction. Two City of Lewisville water supply lines would be relocated prior to the beginning of the construction. This relocation has been incorporated into the Proposed Action (see Section 2.3.2.7).

PFM 4A would require approximately 65,000 cubic yards of borrow material, equating to an estimated disturbance of approximately 5.4 acres of borrow area. The amount of disturbance would depend on ultimate depth of borrow excavation.

2.3.2.2 PFM 4B

This measure would consist of a trapezoidal trench approximately 1,200 feet long. The collection trench would be in the existing drainage ditch just south of the toe road. The collection trench would intersect the sand strata along its length. A berm would also be constructed along the length of the collection trench and extend downstream. The berm would have filter material at the base and would have a sloping top. A parabolic drainage ditch would be included downstream of the toe of the berm. The measure would require rerouting of utilities (communications, electric, municipal, and raw water) that currently serve on-site facilities.

PFM 4B would require approximately 65,000 cubic yards of borrow material, equating to an estimated disturbance of approximately 5.4 acres of borrow area. The amount of disturbance would depend on ultimate depth of borrow excavation.

2.3.2.3 PFM 6

This measure would consist of installing an upstream geomembrane blanket in the approach channel of the spillway. The geomembrane would be installed approximately 3 feet below the current grade and attached to the monoliths. The membrane would extend upstream approximately 40 feet and would be covered with the material removed for its installation. The weir monoliths would be stabilized with post-tensioned anchors with an upstream inclination. The depth of the anchors is currently estimated at 70 feet. A field testing program is planned to further refine the design parameters for the anchors. A work platform or rail system would be required to install the anchors along the downstream slope of the monoliths. Piezometers would also be installed through the monoliths to monitor pore pressures.

PFM 6 would require approximately 13,000 cubic yards of borrow material, equating to an estimated disturbance of approximately 1.1 acres of borrow area. The amount of disturbance would depend on ultimate depth of borrow excavation. This measure would require the disposition of an equivalent 13,000 cubic yards of material, which would be returned to the borrow sites.

2.3.2.4 PFM 7

This measure would include installing apron slabs over the existing apron slabs. A drainage layer would be included between the two slabs. The drain holes in the existing slabs would be filled with filter material to provide an outlet for seepage under the slabs. The drains would outlet through the endcap at the downstream edge of the slabs. The overlay slabs would be 40 feet by 40 feet and would be either keyed or doweled together. Each overlay slab would have nine evenly spaced anchors. A 30-foot turndown would be installed at the end of the apron slabs to provide protection against the degradation of the outlet channel. The measure includes a 2-foot vertical extension of the training walls to account for the freeboard needed from the probable maximum flood event.

Erosion and scour of the spillway channel would be addressed by adding two spillway channel barrier walls. The first wall would be immediately adjacent to the spillway apron and the second would be in the spillway channel, approximately 1,000 feet downstream of the apron. The barrier walls would provide protection to the spillway apron slabs from the continued degradation of the spillway outlet channel and would maintain or slightly increase the tailwater on the apron slabs during a flow event. The barrier walls would run the width of the spillway channel. The wall immediately abutting the apron would be entirely underground, to a depth of 90 feet. The wall downstream of the apron would also be approximately 90 feet deep, but would also extend above ground approximately 3 to 4 feet. The downstream wall may have a riprap approach of approximately 25 feet. The downstream wall would also include a 20-foot wide flat section that could serve as a low water crossing, and include gaps or culverts that would allow complete drainage after a flow event.

PFM 7 would require approximately 2,000 cubic yards of borrow material, equating to an estimated disturbance of approximately 0.2 acre of borrow area. The amount of disturbance would depend on ultimate depth of borrow excavation. This measure would require the disposition of an equivalent 2,000 cubic yards of material, which would be returned to the borrow sites.

2.3.2.5 PFM 2

PFM 2 would be as described in Section 2.2.2.4. PFM 2 would require approximately 13,000 cubic yards of borrow material, equating to an estimated disturbance of approximately 1.1 acres of borrow area. The amount of disturbance would depend on ultimate depth of borrow excavation.

2.3.2.6 PFM 8

PFM 8 would be as described in Section 2.2.2.5. PFM 8 would require approximately 325,000 cubic yards of borrow material, equating to an estimated disturbance of approximately 26.9 acres of borrow area. The amount of disturbance would depend on ultimate depth of borrow excavation.

2.3.2.7 Project Features, Including PFM 10, Required for All PFMs

In addition to these PFM treatments, several actions are anticipated as a required part of implementing any PFM treatment, including access roads, placement of a prefabricated bridge, utility relocation (i.e., PFM 10), and establishment of staging areas. As Jones Road, the main access road for the embankment and the LLELA, would be intermittently closed to the public during the construction period, an access road located parallel to Jones Road would be established to minimize interruptions to public access. The access road would be a gravel, single lane road with turnouts and traffic controls. As part of operations and maintenance, a 50-foot "vegetation clear zone" would be re-established along the toe of the embankment.

In order to minimize project footprint and impact, utility relocations and the access road would be designed to fall within the clear zone. The prefabricated bridge would be installed on top of the existing bridge crossing the Kansas City Southern Railroad Bridge. The bridge would be fabricated offsite, and trucked in and installed within the footprint of the existing road and bridge surfaces.

2.3.2.8 Borrow Sites

Each of the PFMs would require borrow material to be excavated for construction. Initially, three potential borrow sites were identified within the LLELA. Geotechnical analysis has determined the material at each of the three sites is suitable for borrow. These sites have been identified in coordination with the LLELA organizations as the areas that are least likely impactful to education, recreation, restoration, and mitigation efforts that are ongoing in the Project Area. A preliminary screening of potential impacts indicated that using the third site would be least preferable due to the presence of mature riparian and upland forest within the borrow site. Furthermore, the volume of suitable borrow material available in Site A and B is anticipated to be sufficient for the Proposed Action. Therefore, two borrow sites, referred to as Borrow Site A (56.4 acres) and Borrow Site B (32.1 acres) have been identified as part of the Proposed Action (Figure 2-1).

Material would be taken first from Site A, then as needed from Site B.

Geotechnical analysis has confirmed suitable fill as deep as 25 feet within Sites A and B. Based on the measures identified as making up the Proposed Action, the current anticipated total borrow need is 483,000 cubic yards, with an estimated disturbance footprint of approximately 40 acres (based on an average excavation depth of 7.5 feet).

The borrow sites currently reflect the maximum area available for borrow. It is likely that in the course of project design, less borrow would be needed and the disturbed area could be smaller than that considered here. For the purposes of this analysis, however, the most impactful condition, i.e., full use of Site A and B, is analyzed in this EA.

The borrow sites would be used for disposal of any clean fill created through the implementation of the PFM remediation measures. Any fill that is not suitable for disposal on site would be disposed of at an appropriate landfill facility.

2.3.2.9 Habitat Measures

After the dam safety measures have been implemented, the USACE would contour the borrow sites to resemble the natural surrounding terrain, and seed and plant trees on the disturbed land. The plantings would be intended to create a landscape more consistent with historic prairie and savanna conditions, as well as to foster habitat useable for the pollinators on which the habitat depends. The borrow pit planting would aim to establish healthy, native savanna conducive to pollinator health and establishment. Savanna development in the borrow pits would be planted with native herbaceous vegetation, with a substantial milkweed component.

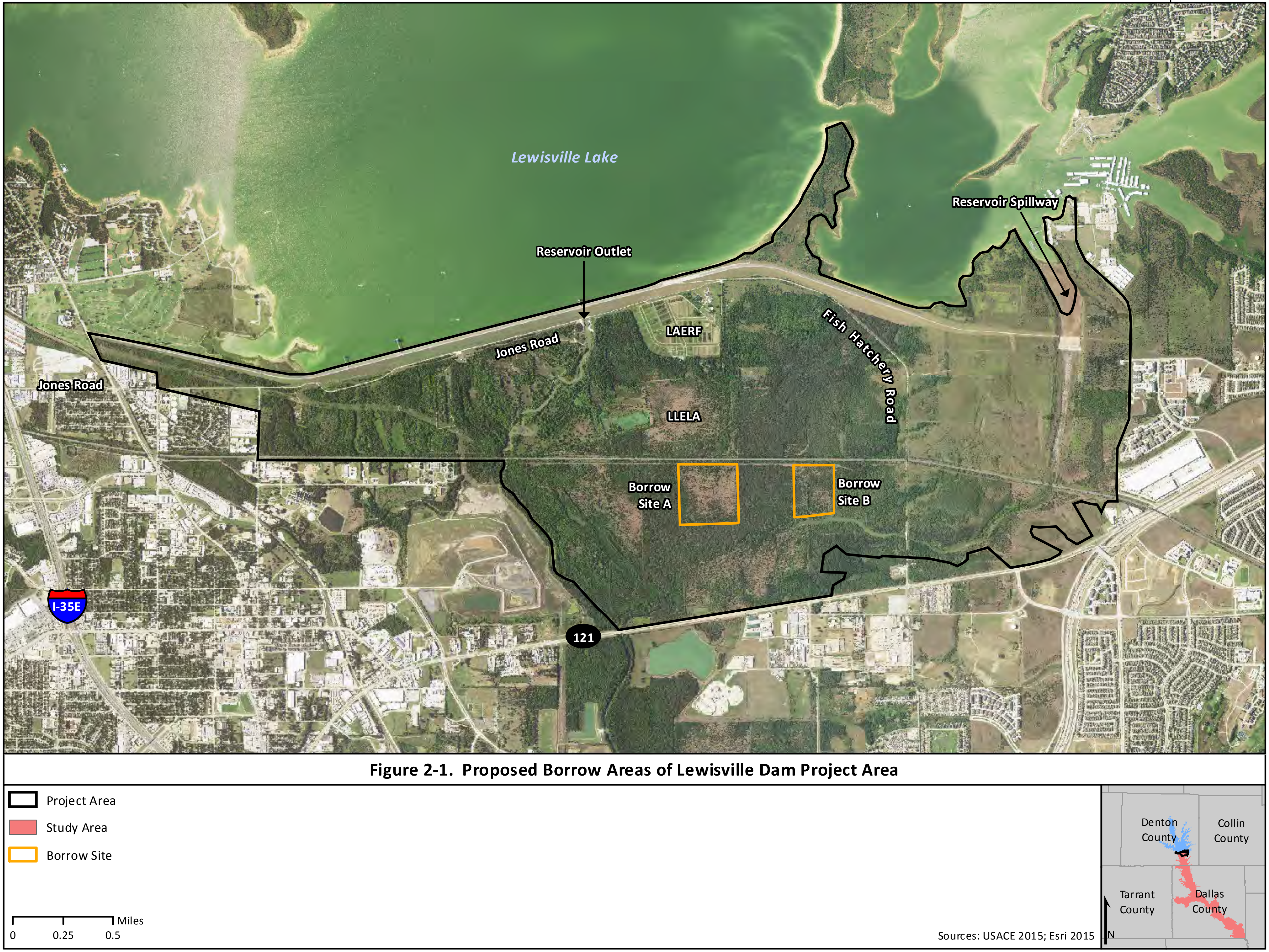


Figure 2-1. Proposed Borrow Areas of Lewisville Dam Project Area

Planting would be guided by the *Ecosystem-based Vegetation Management Prescriptions for Federally-owned Land at Grapevine and Lewisville Lakes* (USACE 2004) ("Management Prescriptions"), USACE Pollinator Enhancement Plan (USACE 2015) and the *National Strategy to Promote the Health of Honey Bees and other Pollinators* (Pollinator Health Task Force 2015), and would use native species. Shrubs and trees would be planted at a density of up to 20 shrubs per acre and 20 trees per acre. Preliminary planting of subplots within the Habitat Measures areas would include a combination of seedlings, bare root shrubs and trees, and containerized plants. This approach would demonstrate the most successful propagation and establishment methodology for most species in the planting site, thus maximizing project resources through application of adaptive management. Grasses and forbs would be planted using drill seeding, i.e., a precision seeding method in which seeds are placed at precise spacing and depth to maximize germination.

Trees and shrubs would be containerized plants up to one- to two-inch diameter at breast height (dbh), or 1 to 2 years old. The tree and shrub species would be planted in mottes (i.e., small groups of trees/shrubs) to replicate savanna-type habitat interspersed with grasslands. The mottes would be planted across the landscape, according to their tolerance for hydric conditions, and commercial availability from year to year. Planting and subsequent adaptive management, monitoring, and maintenance would be done in partnership with LLELA and LAERF.

It is anticipated that adaptive management and monitoring would occur for up to 3 years after implementation. Adaptive management would focus on three areas: 1) native plant community development; 2) control of nuisance plants in response to management actions; and 3) use of prescribed fire, if deemed suitable and in appropriate areas, to promote species diversity. In some cases additional resources may be needed to address issues that occur (such as management of new infestations of invasive species), but in most cases reallocation of resources (e.g., modifying planting lists based upon successes and failure of earlier plantings) would be used to meet or exceed project goals as defined by tree, shrub, vine, and herbaceous plant establishment when combined with nuisance plant control.

2.3.2.10 Implementation Schedule

Construction would be implemented over the course of approximately seven years. Implementation would be divided into two phases: Phase 1 (PFM 4A, 4B, 6, and 7) is proposed to occur between FY 2018 and FY 2020, and Phase 2 (PFM 2 and 8) between FY 2022 and FY 2025. Measures described in Section 2.3.2.7, as well as the borrow sites would be implemented in early 2018 and continue for the duration of the construction schedule. Construction is proposed to occur between FY 2018 to FY 2025.

PFM 4A and PFM 10 measures would be implemented first over the course of approximately 1 year. PFM 4B measures would be implemented after PFM 4A measures are complete, and take approximately 1 year. PFM 6 and PFM 7 measures would be implemented in late 2018, and take approximately 3 years. PFM 8 would begin construction in mid-2022 and take approximately 1 year. PFM 2 would begin construction in mid-2023 and take approximately 1 year.

Grading of the borrow sites would occur after completion of PFM 2; habitat measures would then be implemented and adaptively managed as part of the LLELA area management.

2.3.3 Alternatives Required for Consideration by the DSMS

The USACE DSMS requires the evaluation of five alternatives. However, not all of these required alternatives meet the purpose and need of the Proposed Action, or fall into what might be considered within the "reasonable" range of alternatives under NEPA. The required alternatives are:

- No action alternative;
- Achieving only the tolerable risk limit for life-safety;
- Meeting full tolerable risk guidelines;
- Replace structure; and
- Remove structure.

2.3.3.1 No Action Alternative

Under the No Action Alternative, no improvements would be made to the Lewisville Dam. Existing levels of risk at the Lewisville Dam would persist. The No Action Alternative is not a reasonable action alternative because it does not meet the purpose and need for the Proposed Action. However, as required under CEQ regulations (40 CFR § 1502.14[d]), it does provide a meaningful measure of baseline conditions against which the impacts of the action alternatives can be compared, as well as describe potential future conditions in the absence of the Proposed Action. The FWPC reflects the conditions forecast over a 50-year period of evaluation (year 2020 through 2070).

2.3.3.2 Only Achieving Tolerable Risk Limit for Life Safety

PFM feature Combination 8, as described in Section 2.3.1, was developed to represent the alternative that would reduce risks just within the range of tolerability was tentatively identified. Through more detailed analysis during the Quantitative Risk Assessment conducted February 2016, the USACE determined that the implementation of Combination 8 would lower risk below the tolerable risk limit. As described in Section 2.3.2, the footprints and range of impacts associated with each alternative are not substantially different and would not be a useful analysis for the purposes of informed decision-making.

2.3.3.3 Meeting Full Tolerable Risk Guidelines

The February 2016 Quantitative Risk Assessment determined that each of the PFM feature combinations identified (refer to Table 2-1) would have the potential to meet full tolerable risk guidelines. This conclusion assumed the implementation of the optional PFM 2 and PFM 8 features.

2.3.3.4 Removal of Lewisville Dam

This alternative would involve removing the Lewisville Dam and allowing drainage to the Elm Fork of the Trinity River to return over time to preconstruction conditions. This alternative is not considered viable because of the resulting annual flood damages and lives at risk downstream; the loss of water supply and recreation; the loss of power generation; and the cost of removal and waste generation. This alternative does not meet the purpose and need of the Proposed Action.

2.3.3.5 Replacement of Lewisville Dam

This alternative would involve removing the existing Lewisville Dam and replacing it with a new earth fill dam constructed to modern standards to protect against all deficiencies identified, and to achieve the best safety rating applied to USACE dams nation-wide. The USACE does not consider this alternative viable because it is believed that lower cost alternatives would effectively reduce risk; therefore, the extra costs associated with this potential alternative are not justified. Furthermore, environmental impacts associated with removing and replacing the entire dam would likely be substantially greater than those resulting from any of the considered action alternatives.

CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

3.1.1 Resources to be Analyzed in Detail

This chapter presents a description of the environmental resources and baseline conditions that could be affected from implementing the alternatives, and an analysis of the potential direct and indirect effects of each alternative.

All potentially relevant environmental resource areas were initially considered for analysis in this EA. In compliance with NEPA, CEQ, and 32 CFR part 775 guidelines, the discussion of the affected environment (i.e., existing conditions) focuses on those resource areas that are potentially subject to more-than-trivial impacts. In addition, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

"Significantly," as used in NEPA, requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole (e.g., human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of a proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant (40 CFR part 1508.27). Intensity refers to the severity or extent of the potential environmental impact, which can be thought of in terms of the potential amount of the likely change. In general, the more sensitive the context, the less intense a potential impact needs to be in order to be considered significant. Likewise, the less sensitive the context, the more intense a potential impact would need to be, to be considered significant.

This section describes the existing conditions for each of the following 11 resource areas.

1. Geology, Topography, and Soils
2. Water Resources, including Hydrology and Hydraulics
3. Biological Resources
4. Public Health and Safety
5. Air Quality
6. Cultural Resources
7. Utilities
8. Recreation
9. Transportation
10. Socioeconomics and Environmental Justice
11. Climate

For each resource area section, the resource is: (1) generally defined, (2) given an appropriate region of influence (ROI), and (3) described for existing conditions. The ROI for each resource is a geographic area within which the Proposed Action may exert some influence. The existing conditions discussion for each resource area presents the condition of the resource within each respective ROI.

3.1.2 Planning Horizon

The USACE has identified a planning horizon for this EA. A planning horizon is a period of time covered by a particular plan or planning cycle, and the period of time plan effects are considered. Per the 1996 USACE Planning Manual, the planning horizon encompasses the study period, construction period, period of analysis, and project life. For this EA, the USACE has used a planning horizon with a base year of 2020 and an end year, or FWPC year, of 2070. Thus, the FWPC is defined as the year 2070, unless otherwise noted. Some resource areas have different FWPC years as explained in their respective sections. Notably, because the modelling used to support the analysis of biological resources is not intended to include construction, the 50-year planning horizon for that analysis starts in 2029, and continues through 2079. Conversely, transportation analysis is constrained by available regional traffic forecasts, which considers a shorter planning horizon and looks to the year 2035.

3.1.3 Resources Dismissed from Detailed Analysis

The potential impacts to the following resource areas are considered negligible or non-existent so they were not analyzed in detail in this EA.

3.1.3.1 Land Use

The Project Area is owned by the USACE and managed by LLELA. The Project Area is generally undeveloped, with the exception of the LAERF, some recreational trails on the west side of the Project Area, and dam facilities. LLELA organizations manage the area for education and recreation, and also manage mitigation areas (such as the Bittern Marsh) and some prairie restoration undertakings. Under the Proposed Action, the Project Area would be largely unchanged. The dam facilities footprint would be slightly increased; however, operations and land use at LAERF and within LLELA would be mostly unaffected. No change in land use designation would occur. The Proposed Action would not impact the current use of adjacent land parcels. Therefore, implementation of the alternatives would not result in significant impacts to land use.

3.1.3.2 Noise

The dominant man-made source of noise is airplanes. Beyond the Project Area lies urban development that includes neighborhoods, commercial centers, and industrial facilities. Occasional traffic on the dam access road for maintenance purposes as well as railroad traffic along the Kansas City Southern Railroad located within the LLELA contribute to the existing noise environment. The City of Lewisville Sewage Treatment Plant on the southwest end of the dam may also contribute to the ambient noise in the area. Other noise sources around the lake may generally include activities in parks and recreational areas, areas around homes and schools, activities around commercial areas, and noise from vehicles, watercraft, aircraft, and air conditioning/compressor units. All of these are considered exterior ambient noise sources. A majority of the land within the Project Area is designated for public use. Sensitive receptors within the Project Area include recreational areas in LLELA and Lake Park. The closest residential areas lie approximately 500 feet from the proposed staging areas on the east end of the dam.

Implementation of the Proposed Action would result in temporary intermittent increases in noise associated with construction within the Project Area during the 7-year construction period. No construction activities are anticipated to occur at night. Construction noise levels are dependent on the construction phase and the distance from the construction site. Traffic increases due to mobilizing and demobilizing heavy equipment and the daily use of support vehicles is not expected to increase the noise levels at sensitive receptors living along roadway corridors used to access the site.

In general, the action area is well buffered from sensitive receptors as it lies within undeveloped recreational areas composed of savanna, grassland, upland forest, or riparian woodland. Additionally, as a majority of proposed construction activities would occur in areas that are relatively far away or shielded from identified sensitive noise receptors, impacts would be temporary, low to moderately adverse, and less than significant.

3.1.3.3 Aesthetics

The Lewisville Dam embankment, the spillway, and the outlet works have been part of the lake landscape since the date of construction in 1952, and form a relatively unobtrusive background for the lake overall. The earthen embankment is covered with grass and is consistent with surrounding vegetated areas. Jones Street and Fish Hatchery Road provide access to the LAERF and LLELA, and allow public view of the downstream portion of the dam with its grassy earthen embankment and the low-flow outlets. The spillway and concrete apron are not visible from the nearest public roadway, East Hill Park Road.

The proposed borrow sites are within USACE-owned land on the north side of State Highway (SH) 121; they are not visible to people driving on SH 121 due to dense vegetation lining the highway and the distance and vegetation between the highway and the borrow pits.

The Proposed Action includes noticeable short-term visual features such as staging, borrow, and stockpile areas; haul roads; and platforms. Construction-related visual impacts would include the presence of construction equipment and vehicles, glare, worker activity, dust, and material storage and movement. These visual impacts would be temporary, lasting only the duration of the construction period. The construction would be localized as individual PFM elements are implemented; not all elements would be constructed at the same time. Therefore, the location of the visual impact would be highly variable throughout the construction period.

The proposed borrow sites would be cleared of vegetation and visually change from a combination of savanna and dense forests. In addition, a 50-foot vegetation clear zone along the toe of the embankment would be established. Sections of this clear zone are currently densely forested; therefore, the current visual environment would be altered.

After the dam safety measures have been implemented, the USACE would contour the borrow sites and clear zone to resemble the natural surrounding terrain, and seed and plant trees on the disturbed land. The plantings would be intended to create a landscape more consistent with historic prairie and savanna conditions than existing conditions. Therefore, while there would be short term, less than significant impacts, over the long-term visual impacts would be improved.

3.1.3.4 Hazardous, Toxic, and Radioactive Wastes

For the purpose of this study a search of available environmental records was conducted by Environmental Data Resources (EDR), Inc. along and downstream of the Lewisville Dam. Reports listing all such sites along with existing water well locations found in federal, state, and local records were generated on May 18, 2011 and March 12, 2014 for the project lands downstream of the Lewisville Dam (EDR 2014). A review of historical topographic maps and aerial photographs provided by EDR for the project lands did not indicate any prior land uses that would have been likely to environmentally affect the proposed dam modification areas or borrow pits. No toxic, hazardous, or radioactive materials or wastes are used or stored at the Project Area.

Construction and support activities associated with the Proposed Action would cause short-term increases in the use, storage, and transport of hazardous materials typically associated with construction activity, such as diesel fuel, gasoline, hydraulic fluid, and coolants. Prior to implementing the Proposed Action, the constructions contractor(s) would be required to prepare a Stormwater Pollution Prevention Plan (SWPPP), an Environmental Protection Plan, and a Contingency Action Plan. These plans would be consistent with existing USACE specifications, and would be submitted to and approved by the USACE before construction could begin. These plans would incorporate best management practices (BMPs) to minimize environmental impacts from construction-related activities such as on site use of fuel, hazardous materials, and soil disturbances from excavation and grading. All construction activities with the potential of affecting water quality due to the runoff from the site would be conducted in accordance with the requirements of these plans. Chapter 5 identifies special conservation measures (SCMs) that would be incorporated into these plans to minimize impacts associated with hazardous, toxic, and/or radioactive wastes.

No hazardous, toxic, and radioactive waste materials are anticipated to be created or disturbed with the implementation of the Proposed Action. Potentially contaminated areas or hazardous materials could be encountered during demolition or constructed-related activities; however, the Contingency Action Plan would contain specifications for encountering any potentially contaminated or hazardous material during construction, and material would be handled in accordance with all applicable regulations. Therefore, implementation of the Proposed Action would result in less than significant impacts to hazardous, toxic, and radioactive waste.

3.2 GEOLOGY, TOPOGRAPHY, AND SOILS

3.2.1 Definition of Resource

Geological resources are defined as the topography, geology, mining, and soils of a given area. The geology of an area includes bedrock materials and mineral deposits. Topography describes the physical characteristics of the land such as slope, elevation, and general surface features. The principal geologic factors influencing the stability of structures are soil stability, depth to bedrock, and seismic properties. Soil refers to unconsolidated earthen materials overlying bedrock or other parent material.

3.2.2 Methodology

The methodology for identifying, evaluating, and mitigating impacts to geology and soils was established through review of geological and soils studies and reports as well as federal and state laws and regulations. The ROI for geological resources is the Project Area boundary shown in Figure 2-1.

3.2.3 Regulatory Framework

The relevant federal, state, and local laws and regulations regarding geology, soils, and topography in the Project Area and vicinity are summarized in this section. State and local requirements that were helpful in characterizing the overall context of the analyses, even though some of these requirements do not directly apply to this federal action, are included. The regulatory framework for geology and soils mainly consists of its potential to affect other resources including air and water quality, and the potential effects of seismic hazards, landslides, and mudslides.

- **Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended; 42 USC 5121, et. seq.).** Section 202 of this Act states that the President shall direct appropriate federal agencies to ensure timely and effective disaster warnings for such hazards as earthquakes, volcanic eruptions, landslides, and mudslides.

- **Executive Order (EO) 11988: Floodplain Management.** EO 11988 requires federal agencies to avoid "to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities" for:
    - Acquiring, managing, and disposing of federal lands and facilities;
    - Providing federally undertaken, financed, or assisted construction and improvements; and
    - Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.
- **Section 1541(b) of the Farmland Protection Policy Act of 1980 and 1995, 7 USC 4202(b).** This was enacted to minimize the loss of prime farmland and unique farmlands as a result of federal actions, through conversion of these lands to nonagricultural uses. This includes converting areas that have high quality soil for crop production.

3.2.4 Existing Conditions

3.2.4.1 Topography

Surface topography in the area is gently rolling in the prairie sections to moderately rolling in the timbered areas. The topography of the area around Lewisville Lake is nearly level to moderately steep. Elevations range from 520 to 643 feet above msl. The Project Area is mostly level, consisting of unconsolidated terrace and floodplain deposits.

3.2.4.2 Geology

Lewisville Dam is located at river mile 30.0 on the Elm Fork of the Trinity River, about 1 mile north of Lewisville and about 22 miles northwest of Dallas. The Upper Trinity River Basin is situated within the West Gulf Coastal Plain section of the Coastal Plain physiographic province. The physiography of the area is primarily controlled by surficial geologic material. The West Gulf Coastal Plain section consists of a series of north-south linear belts of alternating smooth, treeless prairies and areas of low, sandy, wooded hills. The regional geology of the Upper Trinity River Basin reflects the various depositional phases and environments that took place during three periods of pre-historical geologic times. The oldest layers, exposed in the northwestern reaches of the basin consist of marine and near shore sand, shale, and limestone layers (bedrock). Younger layers, consisting of near shore sand and marine shale and limestone are exposed at the surface over most of the Upper basin. The younger sediments, which dip gently toward the east and southeast, were deposited unconformably (i.e., missing a layer or layers of the entire regional geologic sequence) over the northwest-dipping older layers after a period of lifting and erosion. The sediments in the Study Area are youngest, a result of the processes of weathering and erosion of the older rocks during more recent times. These sediments are composed of unconsolidated sand, gravel, silt, and clay that make up the alluvial deposits (water-laid) of the Trinity River floodplain and its major tributaries (Ulery et al. 1993)

<u>Primary Formations</u>

Primary bedrock formations occurring at the dam site are the Eagle Ford and Woodbine groups. The bedrock layers in the reservoir area dip southeastward at a gradient of 50 to 60 feet per mile. This is greater than the slope of the land surface, and results in the encounter of progressively younger beds when proceeding in a southeastward direction. Historically, the Eagle Ford group was not subdivided into various member formations at the dam site. For previous project purposes, the Eagle Ford was originally considered a single entity. However, based on more recent mapping in the region of north central Texas, the Eagle Ford Shale is divided into three ascending units: the Tarrant, the Britton, and the Arcadia Park formations. At the dam site, the Woodbine formation has been segregated into the upper Lewisville beds and the lower Dexter Sands. No major structural faulting or folding is known at the dam site or in the reservoir area.

Eagle Ford Formation

The Eagle Ford formation is found on the left abutment and flood plain east of the Elm Fork. The Eagle Ford lies unconformably upon the Woodbine, and is 450 to 500 feet thick. At the dam site, the unweathered Eagle Ford is considered to be a firm, massive, somewhat silty, dark, impervious clay-shale with some thin bentonite (volcanic clay) seams. Bedrock at the project appears to correlate with the upper portions of the Britton formation, which is composed of a 200 feet thick sequence of dark gray clay shale with minor amounts of quartz silt and large numbers of small, flattened, reddish-brown clay iron-stone nodules and light gray limestone concretions. The Arcadia Park formation is approximately 100 feet thick with the basal 10 to 30 feet consisting of dark gray calcareous shale, shaly chalk, and hard beds of gray-orange calcarenite. The remainder of the Arcadia Park formation consists of soft dark olive gray shale (Dallas Paleontological Society 2015).

Woodbine Formation

The Woodbine formation is found on the right abutment and flood plain west of the Elm Fork. The Woodbine was deposited as a fluvial (river) deltaic system consisting of both marine and non-marine facies. The Woodbine formation consists of mostly fine-grained sandstone with clay and shale. It is characterized by cross-bedding, lensing of strata, and frequent localized variations in the dip and strike of the beds, although the direction of the normal dip is to the southeast. The Woodbine formation is estimated to be 300 to 325 feet thick. It outcrops in a broad belt across Denton County, averaging 6 to 13 miles in width. At the site, the Woodbine varies from firm, dark gray shale with numerous thin laminae of very fine grained, light gray, sand, to soft sandstones.

3.2.4.3 Geological Hazards

Meers fault, located approximately 130 miles northwest of the Project Area, is the primary potential source for strong ground motion at the site. The Meers fault is located in an area where multiple faults have been mapped with this fault being active in the last 150 years. The Lewisville Dam is not considered to be in an area with high potential for earthquakes or large seismic activity.

Landslides and mudslides are not natural geologic hazards typically associated with the geography of North Texas. However, in regard to the dam structure, several failure modes located at the embankment of the dam emphasized the need to monitor movement of the embankment. Since its construction, numerous shallow slides have occurred on both the upstream and downstream faces of the embankment.

In addition, the Project Area lies within an area dominated by high clay content soils. The extent of shrinking and swelling is influenced by moisture and the amount and kind of clay in the soil. Shrinking and swelling of soils can cause damage to building foundations, roads and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating (U.S. Department of Agriculture [USDA] 1980).

3.2.4.4 Soils

A total of 55 USDA map unit soil types are found within the Project Area; however, 10 different general soil types comprise 74% of the lands in the Project Area. Table 3.2-1 lists the 10 soils in the ROI, and Figure 3.2-1 shows the locations of these soil types in the Project Area.

Table 3.2-1. Lewisville Soil Types

Soil Types	*Descriptions*
Altoga silty clay	Deep, clayey, gently sloping soil found on high terraces of major streams
Birome fine sandy loam	Moderately deep, gently sloping soil found on convex ridges and lower side slopes, the soil is well drained with rapid surface runoff and slow permeability
Birome-Rayex-Aubrey complex	Gently sloping to moderately steep soils found on convex ridges, these soils are well drained with rapid runoff and slow permeability
Branyon clay	Deep, nearly level soil found on broad, smooth valley fills and ancient terraces or slide slopes of ancient terraces, the soil is moderately well drained with medium runoff and slow permeability
Callisburg fine sandy loam	Deep, gently sloping soil found on foot slopes, low sides of ridges, and/or valley fills of uplands. The soil is well drained with medium runoff and moderately slow permeability
Ferris-Heiden clays	Moderately steep soils found on convex ridges and sides of drains, the soils in this complex are well drained with rapid runoff and slow permeability
Heiden clay	Deep, gently sloping soil found on uplands, convex ridgetops or sides of ridges, the soil is well drained with very slow permeability, runoff is rapid and on steeper slopes often results in a severe hazard for erosion
Navo clay loam	Deep, gently sloping soil found on sides along drains and low hills, the soil is well drained with medium runoff and very slow permeability
Ovan clay	Deep, nearly level soil found on flood plains along major streams, the soil is moderately well drained with slow runoff and very slow permeability
Wilson clay loam	Deep, nearly level soil found on the low part of the landscape along drainages and in concave areas, the soil is somewhat poorly drained with very slow runoff and permeability

Source: USDA 2016.

A potential limitation associated with the soil types within the Project Area is the high clay content of the soils. The Project Area is underlain by highly weathered, high plasticity, high clay fraction ‘soft’ rocks with a significant amount of montmorillonite (>30%). This can lead to the following limitations:

- Weathering (chemical and related physical degradation);
- Leaching (chemical degradation);
- Wetting and softening (increase in moisture content);
- Cyclic drying and wetting (climatic extremes);
- Loss of negative pore pressures (excavated slopes or compacted fill);
- Increase in pore pressures (steady-state seepage); and
- Swell (volume increase related to moisture increase).

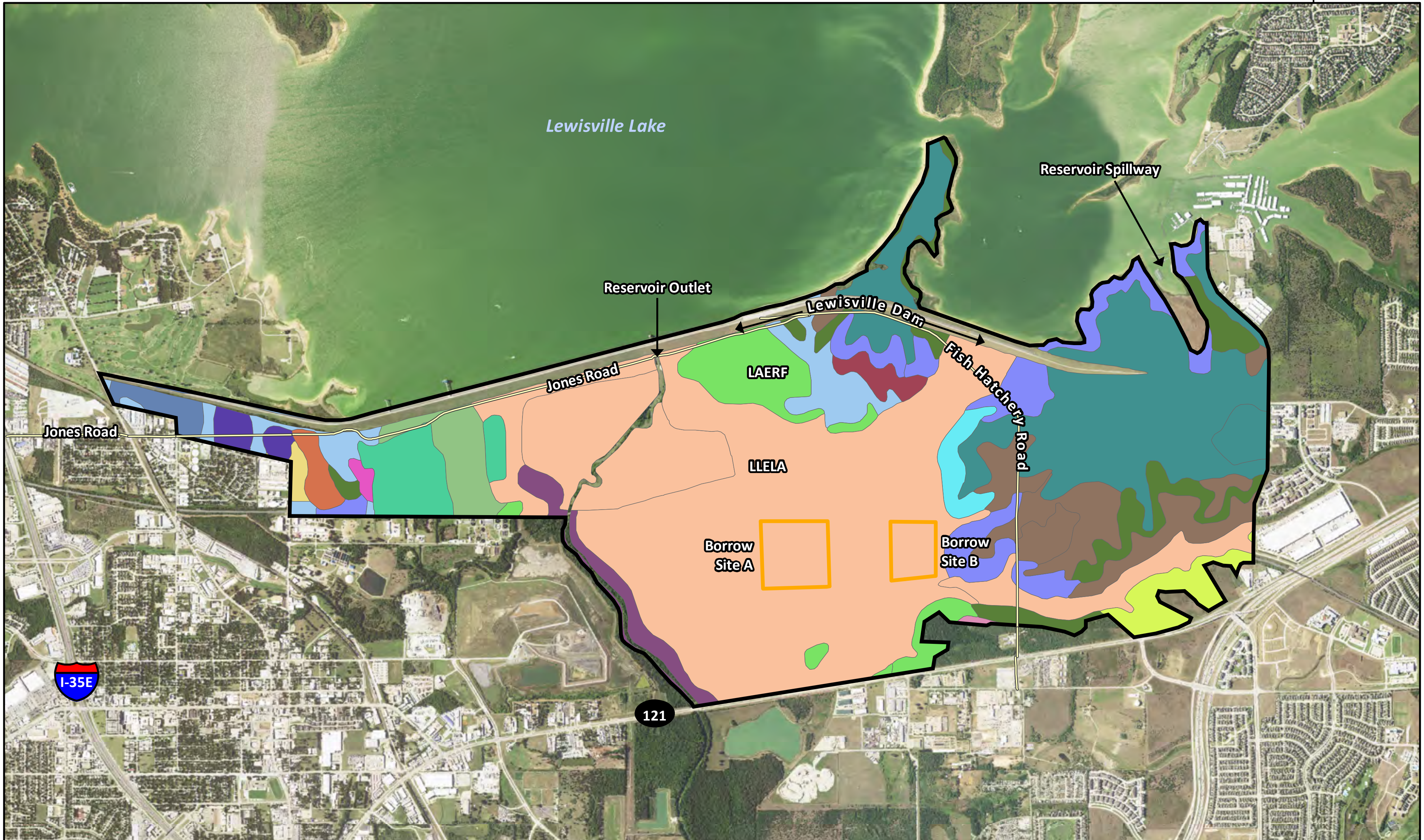


Figure 3.2-1. Existing Soils in the Vicinity of the Project Area

Sources: USACE 2015; Esri 2015; USDA 2013

Hydric Soils

There are only two soil types found in the Project Area that are considered hydric by the National Technical Committee for Hydric Soils. Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic (lack of oxygen) conditions in the upper layer (USDA 2015). The two hydric soils in the Project Area are the Kaufman clay and Tinn clays, both described as frequently flooded. These two types of soils are present but their percent coverage within the respective soil map units where they are located is so limited that the map units themselves are rated as predominantly nonhydric.

Prime Farmland Soils

As required by Section 1541(b) of the Farmland Protection Policy 2 Act of 1980 and 1995, 7 USC 4202(b), federal and state agencies, as well as projects funded with federal funds, are required to (1) use criteria to identify and take into account the adverse effects of their programs on the preservation of farmland, (2) consider alternative actions, as appropriate, that could lessen adverse effects, and (3) ensure that their programs, to the extent practicable, are compatible with state and units of local government and private programs and policies to protect farmland.

No prime farmland exists in the Project Area; therefore, the Farmland Protection Policy Act does not apply and coordination with USDA Natural Resources Conservation Service is not required.

3.3 WATER RESOURCES

3.3.1 Definition of Resource

Water resources include both surface water and groundwater resources; associated water quality; hydrology and hydraulics; and floodplains. Surface water includes all lakes, ponds, rivers, streams, impoundments, and wetlands within a defined area or watershed. Subsurface water, commonly referred to as groundwater, is typically found in certain areas known as aquifers. Aquifers are areas of mostly high porosity rock where water can be stored within pore spaces. Water quality describes the chemical and physical composition of water as affected by natural conditions and human activities. Hydrology is the science that deals with the properties, circulation, and distribution of water on and under the surface of the earth and in the atmosphere from the moment of precipitation until it returns to the atmosphere through evapotranspiration or is discharged into the ocean. Hydraulics is the science that deals with practical applications of runoff flowing through a channel. Collectively, hydrology and hydraulics are referred to as "H&H." Floodplains are relatively flat areas adjacent to rivers, streams, watercourses, bays, or other bodies of water subject to inundations during flood events. A 100-year floodplain is an area that is subject to a 1% chance of flooding in any particular year, or, on average, once every 100 years.

Impacts on aquatic resources can also influence other issues such as land use, biological resources, socioeconomics, public safety, and environmental justice.

3.3.2 Methodology

The following analysis of water resources identifies associated regulatory requirements, describes existing conditions within the ROI and vicinity, outlines the approach to analysis, and evaluates potential impacts and mitigation measures related to implementation of the Proposed Action. The ROI for water resources is the Project Area and the entire Lewisville Lake, which would be the area most affected by implementation of any of the proposed action alternatives selected. The ROI for H&H includes the Upper Trinity River watershed, which is defined as the area extending from the source of the Trinity River to an area located near the Interstate Highway (IH) 20 Bridge, situated in the southern portion of the City of Dallas. The Upper Trinity River watershed covers approximately 6,275 square miles, and includes the majority of the Dallas-Fort Worth Metroplex.

3.3.3 Regulatory Framework

This water resources analysis has been prepared considering the following federal and state regulations and orders.

3.3.3.1 Federal

Clean Water Act

The CWA of 1972, as amended (33 USC §§ 1251 *et seq*.), is the primary federal law that protects the nation's waters, including lakes, rivers, and coastal areas. The CWA prohibits all unpermitted discharge of any pollutant into any jurisdictional waters of the U.S. The U.S. Environmental Protection Agency (USEPA) is responsible for administering the water quality requirements of the CWA. Section 303(d) of the CWA requires all states to identify waters that do not meet, or are not expected to meet, applicable water quality standards. States must develop a total maximum daily load (TMDL) for each pollutant that contributes to the impairment of a listed water body. The Texas Commission on Environmental Quality (TCEQ) is responsible for ensuring that TMDLs are developed for impaired surface waters in Texas.

In addition to the discharge restrictions, the CWA Section 404 requires a USACE-issued permit for the dredging and/or filling of jurisdictional waters of the U.S. Areas meeting the "waters of the U.S." definition are under the jurisdiction of the USACE. Anyone proposing to conduct a project that requires a federal permit or involves dredge or fill activities that may result in a discharge to surface waters and/or waters of the U.S. is also required to obtain a CWA Section 401 Water Quality Certification from the TCEQ, verifying that project activities will comply with applicable water quality standards.

Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 (as amended; 33 USC § 403) regulates structures or work that would affect navigable waters of the U.S. Structures include any pier, wharf, bulkhead, etc. Work includes dredging, filling, excavation, or other modifications to navigable waters of the U.S. The USACE issues permits for work or structures in navigable waters of the U.S.

Safe Drinking Water Act

Congress originally passed the Safe Drinking Water Act in 1974 (42 USC §§ 300 *et seq*.) to protect public health by regulating the nation's public drinking water supply. The law, amended in 1986 and 1996, requires many actions to protect drinking water and its sources.

EO 11988: Floodplain Management

EO 11988 requires federal agencies to avoid "to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative." In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities" for:

- Acquiring, managing, and disposing of federal lands and facilities;
- Providing federally undertaken, financed, or assisted construction and improvements; and

- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing activities.

USACE ER 1165-2-26 contains the USACE's policy and guidance for implementing EO 11988. Per ER 1165-2-26, the USACE must first determine whether there are practicable alternatives to placing a proposed project in a floodplain. In addition, ER 1165-2-26 specifies that all reasonable factors should be taken into consideration when determining practicability. These factors are conservation; economics; visual elements; natural and beneficial values served by floodplains; impact of floods on human safety; locational advantage; the functional need for locating the development in the floodplain; historic values; fish and wildlife habitat values; endangered and threatened species; federal and state designations of wild and scenic rivers, refuges, etc.; and in general, the needs and welfare of the people.

EO 11990: Protection of Wetlands

EO 11990 requires that governmental agencies, in carrying out their responsibilities, provide leadership and "take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands." Each agency is to consider factors relevant to a proposed project's effect on the survival and quality of the wetlands by maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, and wildlife. If no practical alternative can be demonstrated, agencies are required to provide for early public review of any plans or proposals for new construction in wetlands.

3.3.3.2 State

Section 26 of the Texas Water Code

Section 26 of the Texas Water Code requires that a project develop and implement a SWPPP prior to and during construction activities, as required by the CWA.

State of Texas Water Quality Certification

A project must obtain a water quality certification from the TCEQ prior to the start of construction, as required by the CWA.

3.3.3.3 Hydrologic and Hydraulic Modeling and Evaluation Process

The evaluation process for the hydraulic impacts of a proposed project requires that a permit applicant secure the services of an engineer capable of preparing a Hydrologic Engineering Center-River Analysis System (HEC-RAS) hydraulic model using the current CDC HEC-RAS model as a base condition. The CDC HEC-RAS model is maintained and usually distributed by the USACE to be used for evaluation of all projects that require a Section 408 Permit or a CDC Permit.

3.3.4 Existing Conditions

3.3.4.1 Surface Water

Lewisville Lake is located along the Elm Fork Trinity River within the Upper Trinity River basin. The drainage basin for the Elm Fork of the Trinity River encompasses approximately 1,660 square miles (Texas Water Commission 1963). Lewisville Lake has a surface area of 28,980 acres. Major perennial streams located within the Study Area include Prairie Creek and the Elm Fork Trinity River below Lewisville Dam. Along the eastern side of the lake, perennial streams include Stewart Creek, Cottonwood Branch, Panther Creek, Doe Branch, Little Elm Creek, and Running Branch. The major stream located on the northern portion of the lake is the Elm Fork Trinity River as it feeds into Lewisville Lake, while perennial streams located on the western side of the lake include Cooper Creek, Pecan Creek, Bryant Branch, Hickory Creek, and Clear Creek. There are many intermittent and ephemeral streams feeding into Lewisville Lake or the other major tributaries throughout the Study Area.

Wetlands and other waters of the U.S. are regulated under Section 404 of the CWA, as amended, and EO 11990, *Protection of Wetlands*. According to USACE regulations, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Information regarding wetlands within the Project Area was obtained from an in-house literature review and limited on-site visits during the habitat evaluation surveys for project lands south of Lewisville Dam. The in-house literature review included USFWS National Wetlands Inventory maps and the Soil Conservation Service published soil survey for Denton County, Texas (Figure 3.3-1). During site visits, accessible portions of the project lands below Lewisville Dam were examined for the presence of wetlands. A wetland delineation, which identifies the wetland boundary, was not performed within the Project Area. Rather, a general determination was made as to the presence or absence of wetlands at a location.

The portion of the Project Area below the dam includes palustrine emergent, scrub-shrub, and forested wetlands, as well as various types of fringe wetlands associated with the Elm Fork of the Trinity River and smaller tributaries. LLELA and LAERF routinely perform wetland restoration activities in wetlands below the dam (e.g., invasive species control and native wetland species plantings) to promote increased diversity and habitat quality. The Elm Fork of the Trinity River and smaller tributaries, including the spillway and associated downstream spillway channel, and associated fringe wetlands are jurisdictional waters of the U.S.

LAERF is located on the downstream side of the dam and contains several experimental ponds that support studies on biology, ecology, and management of aquatic plants. Ponds and raceways are supplied with water from Lewisville Lake. The ponds are filled and drained independently for control of different hydrologic regimes (LAERF 2015). The ponds and raceways associated with LAERF facility are considered non-jurisdictional because they are man-made (from uplands) and constantly manipulated; converted from the old fish hatchery ponds; and the source of hydrology is controlled by operations of LAERF.

Areas exhibiting potential wetland and drainage channel characteristics associated with Seepage Areas 1 and 2 are considered non-jurisdictional because the source of hydrology is man-made water seepage through the dam structure and if the seepage is removed, the hydrology source for these areas exhibiting wetland characteristics goes away. In addition, these areas were not part of the original dam design and have been continuously managed as part of the overall dam structure maintenance program to control and reduce seepage.

The banks on the eastern side of the lake are generally too steep or of unsuitable substrate to accommodate a great deal of wetland development. The more gradual slope of the lake’s western bank allows for a greater floodplain area and, subsequently, more lacustrine emergent, scrub-shrub, and forested wetlands. Wetlands are also prevalent at the far end of the Hickory Creek arm of the lake and in the area along the Elm Fork of the Trinity River before it enters the lake. Lewisville Lake and associated wetlands are jurisdictional waters of the U.S.

Figure 3.3-1. National Wetland Inventory Features in the Project Area

Project Area
Study Area
Borrow Site
Road
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Riverine
Other

Sources: USFWS 2014; USACE 2015; Esri 2015

3.3.4.2 Groundwater

Groundwater within the Study Area is available from a major aquifer (Trinity) and a minor aquifer (Woodbine). The Trinity Aquifer extends across much of central and northeastern portion of Texas averaging approximately 600 feet of freshwater saturated thickness within the Study Area. This major aquifer is composed of several smaller aquifers contained within the Trinity Group: Antlers, Glen Rose, Paluxy, Twin Mountains, Travis Peak, Hensell, and Hosston. The Paluxy and Twin Mountains aquifers of the Trinity Group occur within the Study Area. The Paluxy Aquifer is composed of sandstone, mudstone, and limestone, and the Twin Mountains Aquifer consists of sand with interbedded clay, limestone, dolomite, and gravel.

The Woodbine is a minor aquifer located in northeast Texas. The Woodbine aquifer overlies the Trinity Aquifer and consists of sandstone interbedded with shale and clay that form three distinct water-bearing zones. The Woodbine Aquifer reaches 600 feet in thickness in subsurface areas with a freshwater saturated thickness averaging approximately 160 feet. It is a primary drinking water aquifer that serves as a water supply resource to the region. Abundant springs and seeps have been historically noted, and artesian pressures were noted as early as the late 1800s by the first drillers to penetrate the Eagle Ford Shale and encounter the Woodbine. Wells drilled throughout the region were free flowing at hundreds of gallons per minute (gpm) for many years until increased groundwater withdrawal reduced the artesian conditions. However, after the construction of multiple surface water reservoirs, and increased surface water supply options, the reduced use of groundwater has resulted in a partial return of higher water levels and artesian pressures in the Woodbine. The Woodbine aquifer is confined to semi-confined beneath the Eagle Ford Shale.

3.3.4.3 Water Quality

Existing water quality is affected by rainfall and associated stormwater flows originating from residential, commercial, and industrial point and nonpoint sources from properties adjacent to the Study Area. These stormwater flows have increased over time with increased urbanization and development. The TCEQ sets and implements standards for surface water quality to improve and maintain the quality of water in the state based on various beneficial use categories for the water body. The Texas Integrated Report of Surface Water Quality, which is a requirement of the federal Clean Water Act Sections 305(b) and 303(d), evaluates the quality of surface waters in Texas and identifies those that do not meet uses and criteria defined in the Texas Surface Water Quality Standards (TSWQS). The TCEQ produces a new report every 2 years in even-numbered years, as required by law. The Texas Integrated Report describes the status of Texas' natural waters based on historical data, and assigns waterways to various categories depending on the extent to which they attain the TSWQS.

Water bodies are divided into and evaluated by defined, classified segments. Classified segments located within the Study Area are as follows:

- Segment 0822 – Elm Fork Trinity River below Lewisville Lake (From the confluence with the West Fork Trinity River in Dallas County to Lewisville Dam in Denton County)
- Segment 0823 – Lewisville Lake (From Lewisville Dam in Denton County to a point 100 meters upstream of U.S. Highway 380 in Denton County, up to normal pool elevation of 515 feet [impounds Elm Fork Trinity River])

- Segment 0823A – Little Elm Creek (Unclassified water body) (From confluence with Lewisville Lake in Denton County, up to 1.4 kilometers above Farm to Market 453 in Collin County)
- Segment 0823B – Stewart Creek (Unclassified water body) (From the confluence with Lewisville Lake in Denton County to the headwaters near Frisco in Collin County)
- Segment 0823C – Clear Creek (Unclassified water body) (From the confluence with Lewisville Lake in Denton County to the headwaters west of Montague in Montague County)
- Segment 0823D – Doe Branch (Unclassified water body) (From the confluence with Lewisville Lake/Elm Fork Trinity in Denton County to the headwaters northeast of Celina in Collin County)

According to the 2014 Texas Integrated Report of Surface Water Quality, all segments located within the Study Area are classified as Category 2, which is defined as follows: some standards are attained; no evidence that nonattainment of any standard will occur in the near future; and insufficient or no data and information are available to determine if the remaining standards are attained (TCEQ 2015a). No segments located within the Study Area are listed as impaired on the 2014 Texas 303(d) List (TCEQ 2015a); however, the 2014 Texas Integrated Report Water Bodies with Concerns for Use Attainment and Screening Levels (TCEQ 2015b) identifies three of the six segments within the Study Area as having some level of concern for various parameters. Assessment of each beneficial use is accomplished by applying several assessment methods. These methods often have several criteria or screening levels that are used to evaluate assessment parameters. Use attainment assessment methods are used to determine use support and concerns for near-nonattainment. Water quality concerns are determined based on a defined amount of exceedance of screening levels and potential lack of information in data sets used to evaluate various parameters. Table 3.3-1 provides a listing of parameters of concern by water body segment within the Study Area.

Table 3.3-1. Parameters of Concern within the Study Area

Water Body Segment	*Parameter of Concern*	*Level of Concern**	*Water Body Use of Concern*
Segment 0822 – Elm Fork Trinity River Below Lewisville Lake	Chlorophyll-a	CS	General Use
	Depressed dissolved oxygen	CS	Aquatic Life Use
Segment 0823 – Lewisville Lake	Ammonia	CS	General Use
	Chlorophyll-a	CS	General Use
	Nitrate	CS	General Use
	Total Phosphorus	CS	General Use
Segment 0823B – Stewart Creek (Unclassified water body)	Nitrate	CS	General Use
	Total Phosphorus	CS	General Use

Notes: * CS = Concern - screening levels indicate marginal water quality for parameter by concern assessment methods; CN = Concern for near nonattainment for parameter of the use.
Source: TCEQ 2015b.

3.3.4.4 Hydrology and Hydraulics

Within the Trinity River Basin there are eight projects operated as a multi-purpose system by the USACE: Bardwell, Benbrook, Grapevine, Joe Pool, Lavon, Lewisville, Navarro Mills, and Ray Roberts (Figure 3.3-2). Several lakes not operated by the USACE are also part of the system: Bridgeport Reservoir, Eagle Mountain Lake, Lake Worth, Lake Ray Hubbard, Mountain Creek Lake, Cedar Creek Lake, Richland Chambers Lake, and Lake Livingston. Lewisville Lake is operated as a unit in the system for development of the water resources of the Trinity River Basin in Texas. Lewisville Lake is primarily regulated for control of floods on the Elm Fork of the Trinity River. Located upstream of the Study Area, Ray Roberts Lake is operated with Lewisville Lake to provide added flood risk management and conservation storage.

The drainage area above Lewisville Dam is 1,660 square miles, of which 692 square miles (42%) is controlled by Ray Roberts Dam; the Lewisville Dam controls the balance. The basin has gently rolling hills and broad river valleys, with generally greater relief in the upper reaches. The topography, soils, and typical rainfall patterns of the Lewisville watershed lead to rapid runoff and sharp-crested inflow hydrographs. Floods in this region can occur at almost any time of the year. Historic storms have often been preceded by scattered rainfall resulting in a saturated watershed prior to the main rainfall event.

Flood control releases from Lewisville Dam are coordinated with releases from existing lakes for maximum flood protection in the Trinity River Basin. Flood storage in the eight projects operated by the USACE in the Trinity River System is released as soon as downstream channel capacity is available. The lake levels are lowered to their conservation pools at the earliest possible date in order to provide flood protection against future storms. Controlled releases from Lewisville Lake are made at a rate such that when they are combined with flows from downstream areas they will not exceed the controlled stages and channel capacities (Table 3.3-2).

Table 3.3-2. Key Downstream Control Points

River Channel Control and USGS Capacity	*Control Stage (feet)*	*Control Capacity (cubic feet per second)*
Elm Fork near Carrollton	8.20	7,000
Trinity River at Dallas	34.25	13,000
Trinity River near Rosser	25.50	15,000
Trinity River near Oakwood	39.45	24,000

Note: USGS = U.S. Geological Survey.

The following summarizes lake operation procedures for the range of lake level elevations:

1. **Lake elevation at or below 522.0 feet (Top of Conservation Pool)**. Releases for water supply will be made upon request from the City of Dallas or the City of Denton. Releases combined with local flow downstream should not exceed 5,000 cubic feet per second (cfs) on the Elm Fork at the Carrollton Gage. This release was increased from 4,000 cfs as part of the Interim Risk Reduction Measures Plan in 2011. For water quality purposes, releases less than 650 cfs will be discharged through the multi-level sluice gate outlet. Releases in excess of 650 cfs will be discharged by using a combination of both the multi-level sluice gate outlet and the flood control gates.
2. **Lake elevation between 522.0 feet and 523.0 feet**. If the lake elevation is between 522.0 feet (top of conservation pool) and forecasted to remain below 523.0 feet (10% of flood pool), flood releases will be made not to exceed 4,000 cfs. This is done to evacuate floodwater as quickly as possible. These releases will be coordinated with other flows in the Elm Fork system so as not to exceed 4,000 cfs at the Carrollton gage on the Elm Fork and 13,000 cfs at Dallas, 15,000 cfs at Rosser, and 24,000 cfs at Oakwood gages on the main channel of the Trinity River.
3. **Lake elevation between 523.0 feet and 526.0 feet**. If the lake elevation is forecasted to rise to between elevation 523.0 feet and elevation 526.0 feet, releases when combined with downstream flow should not exceed 5,500 cfs at the Carrollton gage on the Elm Fork, and on the Trinity River at Dallas, Rosser, and Oakwood gages the control flows are 13,000, 15,000, and 24,000 cfs, respectively.

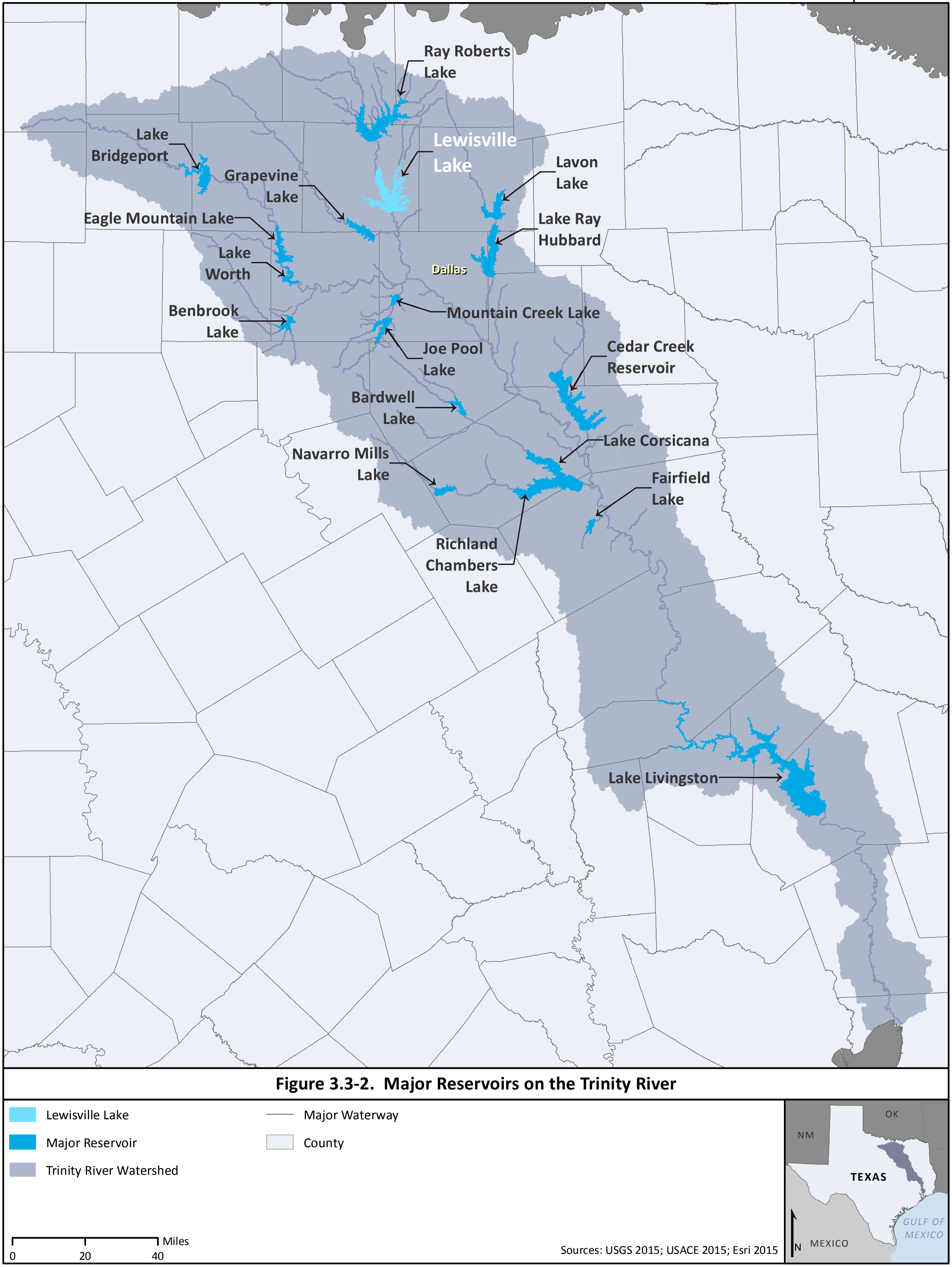


Figure 3.3-2. Major Reservoirs on the Trinity River

4. **Lake elevation between 526.0 feet and 532.0 feet**. If the lake elevation is forecast to rise to between elevation 526.0 feet and elevation 532.0 feet (top of flood pool), releases should not cause the flow to exceed 7,000 cfs at the Carrollton gage on the Elm Fork, and at Dallas, Rosser, and Oakwood gages the control flows are the same as above.
5. **Lake elevation above 532.0 feet**. Gated releases when combined with spillway discharges should not exceed the flows stated above for elevation levels between 526.0 feet and 532.0 feet.

3.3.4.5 Floodplains

The creation of Lewisville Lake altered the floodplain along the Elm Fork of the Trinity River by modulating overbank flooding below the Lewisville Dam. The restriction of floodwater and sediment transport out into the floodplain has decreased the ecological value of the floodplain system downstream of the dam effectively reducing the riverine corridor width, and cut off connections to adjacent wetland habitats. Filtering and buffering functions of the riverine corridor has been disrupted and aquatic habitats such as cut banks, pools, sandbars, and other habitats have been reduced by interruption of sediment flows which become blocked by the dam. The majority of the Project Area is located within the 100-year floodplain with the exception of some areas located south of the Lewisville Dam (Figure 3.3-3).

3.4 BIOLOGICAL RESOURCES

3.4.1 Definition of Resource

Biological resources include plants and animals and the habitats in which they occur. Biological resources are important because: (1) they influence ecosystem functions and values, (2) they have intrinsic value and contribute to the human environment, and (3) they are the subject of a variety of statutory and regulatory requirements. The ROI for biological resources is the Project Area; the ROI for habitat impacts is limited to the action area, that is, the area within the Project Area subject to disturbance by the Proposed Action. Figure 3.4-1 displays the habitats found within the Project Area.

3.4.2 Methodology

The USFWS has prepared a series of PALs and a PAR to assess the baseline habitat conditions and predict future habitat conditions with and without the Proposed Action. As part of the preparation of the 2014 PAR, the USACE and USFWS completed an assessment of aquatic habitat using the Texas Index of Biotic Integrity (IBI) model. The complete IBI analysis is included in Appendix F of the 2014 PAR, and is summarized here. The 2016 PAR (Appendix C) includes the projections for conditions with the Proposed Action implemented. For a discussion of the Fish and Wildlife Coordination Act process, as well as USFWS/USACE coordination for the Proposed Action, refer to Section 1.7.1.

Terrestrial habitat was evaluated in the PAR using Habitat Evaluation Procedures (HEP) to estimate habitat suitability within the action area. Habitat suitability indexes (HSIs) range from zero to one and are based on USFWS HEP models that relate the various attributes of the habitat to its potential utilization by particular species. The product of a habitat suitability index and the acreage of the corresponding habitat equals “habitat units (HUs),” a metric used to determine net gains and losses of habitat value (USFWS 2016a). The detailed HEP analysis is included in the 2016 PAR (Appendix C of this document), and is summarized here.

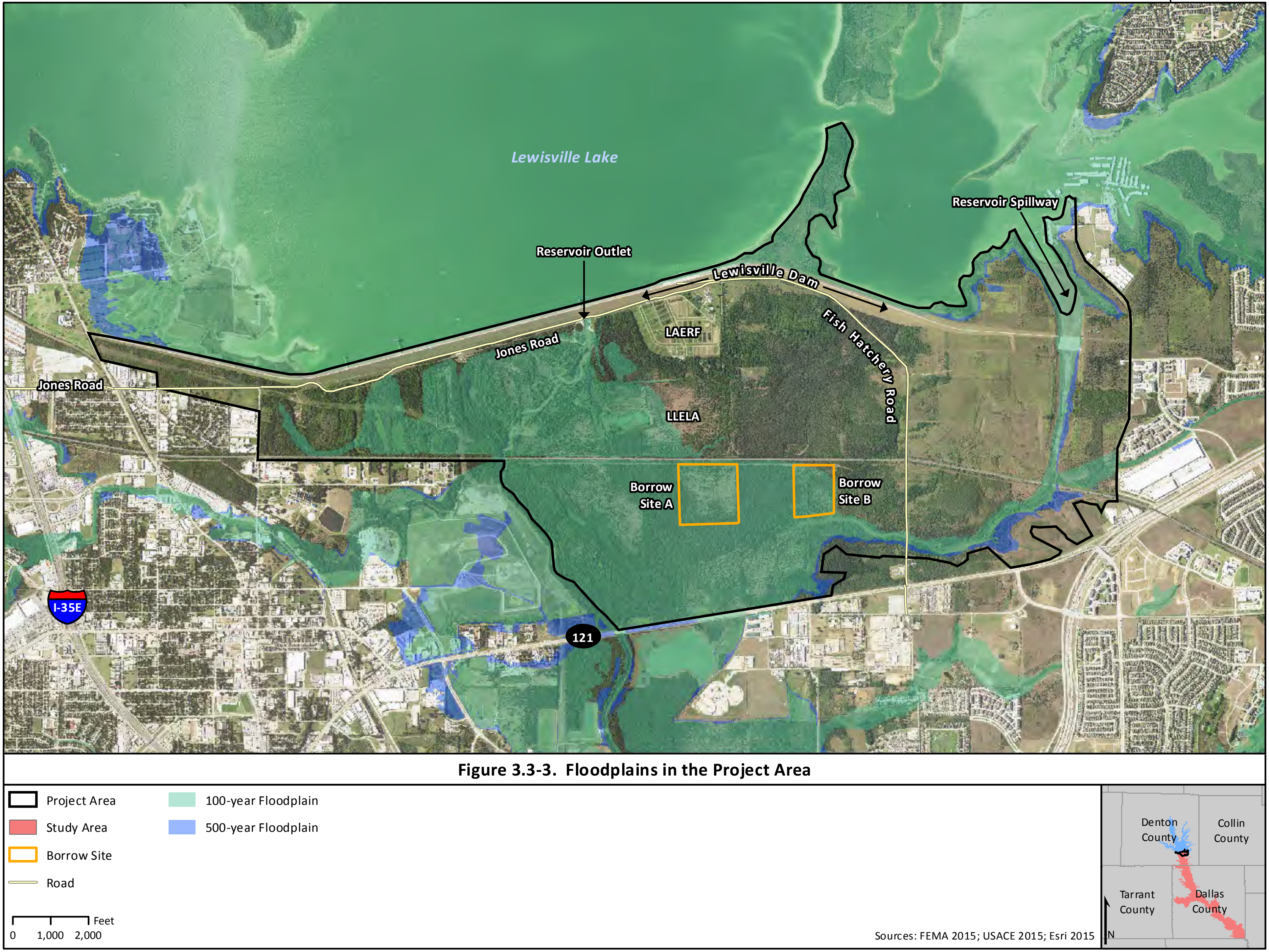


Figure 3.3-3. Floodplains in the Project Area

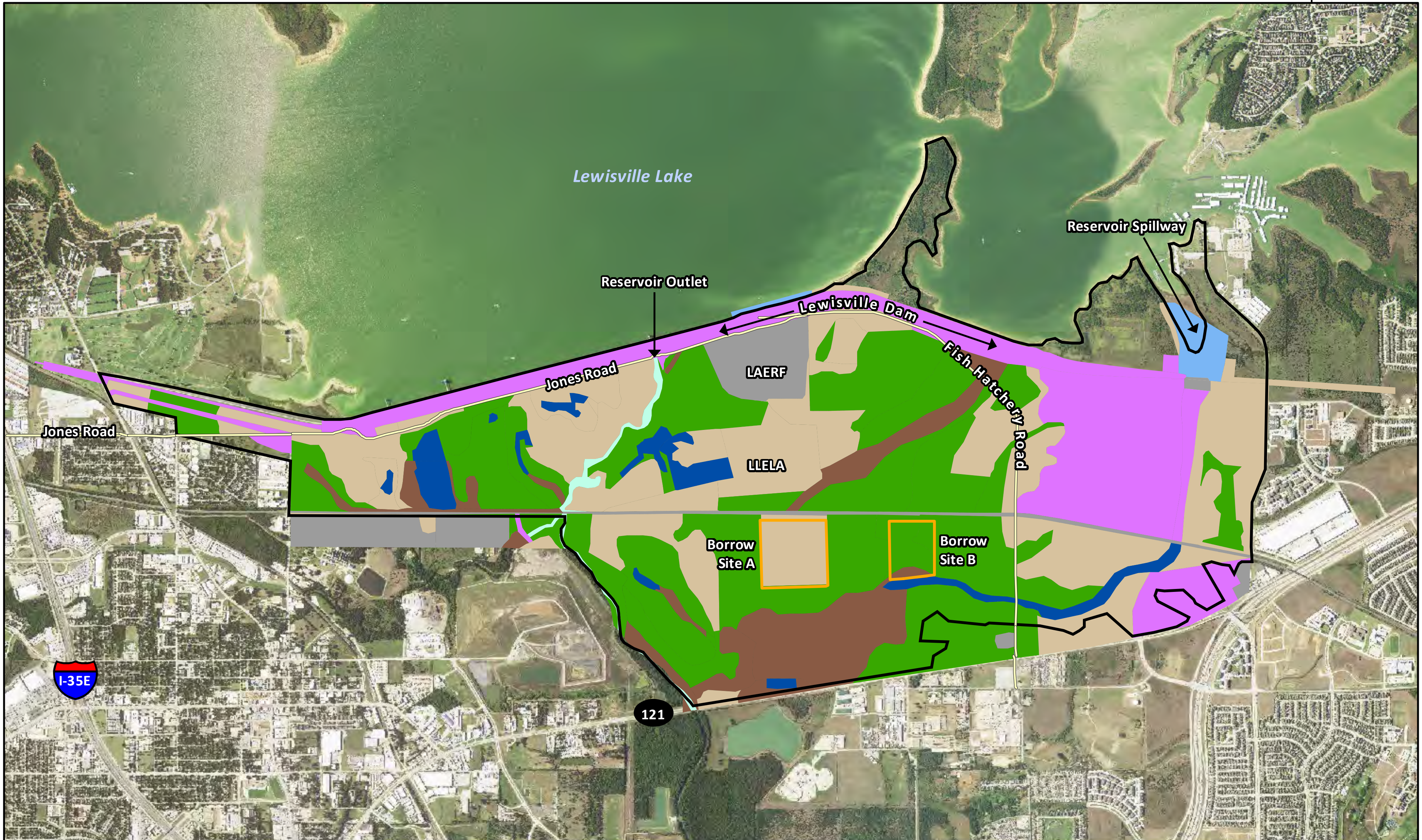
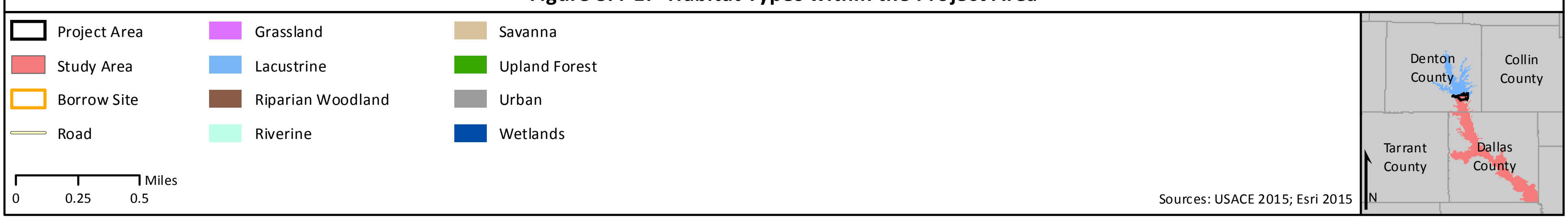


Figure 3.4-1. Habitat Types within the Project Area



3.4.3 Regulatory Framework

- **Endangered Species Act (16 USC §§ 1531-1544).** The ESA affords protection for federally listed threatened and endangered species and, where designated, critical habitat for those species.
- **Fish and Wildlife Coordination Act (16 USC §§ 661-667e).** The Fish and Wildlife Coordination Act requires the USACE to coordinate with the USFWS and Texas Parks and Wildlife Department (TPWD) on water resources related projects to obtain their views toward preservation of fish and wildlife resources and mitigation of unavoidable impacts.
- **USACE Habitat Mitigation Process.** The USACE has established a goal of no net loss of aquatic resource values for bottomland hardwoods, open water, emergent (herbaceous) wetlands, and aquatic riverine. ER 1105-2-100 (the USACE *Planning Guidance Notebook*) ensures that project-related adverse environmental impacts (i.e., impacts on fish and wildlife resources) have been avoided or minimized to the extent practicable, and that remaining unavoidable significant adverse impacts are compensated to the extent justified. To this end, a mitigation plan would be required. For additional discussion of what is required in a mitigation plan, refer to Chapter 7.
- **Migratory Bird Treaty Act (16 USC §§ 703-712) and EO 13186, *Conservation of Migratory Birds*.** The Migratory Bird Treaty Act (MBTA) of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance with the MBTA's policies and regulations. Under EO 13186, federal agencies are directed to evaluate the impacts of their actions on migratory birds in NEPA documents and to conserve migratory birds, giving priority to species of concern (listed by USFWS), and their important habitats.
- **EO 13112, *Invasive Species.*** Dated February 3, 1999, this EO directs federal agencies to expand and coordinate their efforts to combat the introduction and spread of "invasive species" (i.e., noxious plants and animals not native to the U.S.). Non-native flora and fauna can cause significant changes to ecosystems, upset ecological processes and relationships, and cause harm to our nation's agricultural and recreational sectors. Those species that are likely to harm the environment, human health, or economy are of particular concern.
- **Parks and Wildlife Code 12.0011, Texas Parks and Wildlife Department.** Parks and Wildlife Code 12.0011 affords protection to Texas threatened and endangered species. Functionally, the TPWD oversees endangered resources through the Wildlife Division.

3.4.4 Existing Conditions

This section is divided into six subsections as follows:

1. **Aquatic Habitat –** the definition and distribution of aquatic habitats in the ROI and a qualitative assessment of the eco-regions present.
2. **Terrestrial Resources** – the definition and distribution of the vegetation in the ROI and a qualitative assessment of the habitats present.
3. **Wildlife –** general aspects of the fauna of the ROI, including migratory birds.
4. **Fish and Wildlife Management –** the description of what activities are regulated or prohibited in management areas.
5. **Special Status Species** – the occurrence of state- and federally-listed species, candidate species, and other species of local or regional concern listed by the TPWD.

6. **Invasive Species** – the occurrence of non-native, invasive species as defined in the 1999 EO 13112.

3.4.4.1 Aquatic Habitat

With the exception of the altered hydrology resulting from the operation of the Lewisville Dam, the aquatic habitat of the Elm Fork of the Trinity River between the dam and just downstream of Texas Highway 121 is relatively intact. In-stream habitat throughout this reach consists of relatively shallow riffles and runs with lateral scour pools associated with river bends. In-stream habitat structures, such as logs, fallen branches, and root wads are common throughout the ROI, and in some areas, log jams increase habitat diversity by creating backwater habitats.

Riverine

Aquatic riverine habitat within the action area includes 0.5 acre of the Elm Fork River adjacent to, and fed by, the outlet structure for Lewisville Lake. Aquatic riverine habitat in the Elm Fork exhibits exceptional overall aquatic life use value, with an average IBI of 0.86 resulting in 0.43 HUs. The limiting factors for the IBI included difficulties accessing and properly surveying sites, such as steep banks, undercut banks, and slick substrate. In addition, evaluated sites were lacking riffle habitat, which may have impeded the collection of a representative sample of the fish community.

Lacustrine

The action area contains 17.7 acres of lacustrine habitat (i.e., "lake" habitat), or 0.06% of the total lake area. This habitat is on the upstream side of the spillway and is irregularly inundated, varying with lake level. The area is also subject to periodic dredging for maintenance by the USACE. Because of the highly variable nature of this section of the lake, as well as regular disturbance and the relatively small proportion the action area includes of the continuous lacustrine habitat, an estimate of the IBI of this habitat would not be useful in this analysis. For this reason, lacustrine habitat is not included in the quantitative analysis. Qualitative descriptions of lacustrine impacts have been included as appropriate.

3.4.4.2 Terrestrial Resources

Vegetation

The Project Area is located mostly in the Blackland Prairie ecoregion, with some remnants of the Cross Timber ecoregion at the project site. The lake lies on the edge of both ecoregions. Historically, the area was predominantly tall grass prairie with trees along watercourses, sometimes scattered on the prairie or concentrated in certain areas possibly as a result of locally favorable soil conditions or topography. Fire was probably an important factor in maintenance of the original prairie vegetation and had a major impact on the community structure (Strickland & Fox 1993). With the exception of preserves, small remnants, or native hay meadows, almost nothing remains of the original Blackland Prairie communities. Conversion of the Blackland Prairie for agriculture was the most significant cause of the destruction of this ecosystem, with only marginal, steeply sloped land not rapidly brought under cultivation.

Soil types within the Project Area favor establishment of the Tallgrass Prairie Community typical of floodplains, stream terraces, and uplands along this portion of the Trinity River floodplain. This community is characterized by deeper soils underlain at rather shallow depths by dense, hard, clayey material. This "claypan" restricts air and water movements, as well as root penetration. It is typically dominated by warm-season, perennial tallgrasses, with warm season, perennial midgrasses filling most of the remaining species composition. Historically, woody species made up a minor component of the community, 5% or less (USDA 2009). The tree species noted most often in the Blackland Prairie ecoregions of the Project Area during data collection were green ash (*Fraxinus pennsylvanica*), pecan (*Carya illinoinensis*), black willow (*Salix nigra*), American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), cedar elm (*Ulmus crassifolia*), red mulberry (*Morus rubra*), and bur oak (*Quercus macrocarpa*). The Cross Timbers ecoregion portions of the Project Area are typified by blackjack oak (*Quercus marilandica*), Shumard oak (*Quercus shumardii*), and black hickory (*Carya texana*). Although past agriculture practices have brought upland characteristics to portions of the Project Area, historically more of it was likely dominated by additional riparian woodland forest.

Pockets of non-native, invasive species such as chinaberry *(Melia azedarch)*, Chinese privet (*Ligustrum sinense*), and Bradford pear *(Pyrus calleryana)* were identified during habitat surveys conducted in October 2013. An invasive species management program has been implemented by LLELA organizations to curtail the spread of invasive species and reduce the extent of infestation. Current invasive species control efforts include management of Chinese privet, parrot feather (*Myriophyllum aquaticum*), nodding thistle (*Carduus nutans*), Queen Anne's lace (*Daucus carota*), mustards (*Brassica* and *Rapistrum* species *[spp.]*), and sweet scabious (*Scabiosa atropurpurea*). Additional detail on invasive species is provided in Section 3.4.4.5.

<u>Wildlife</u>

The Project Area is used by both resident and migratory wildlife species, especially those that are tolerant of human activity. Small mammals and migratory and resident passerines use the wooded areas along the watercourses for nesting, foraging and as a dispersion corridor. The more heavily impacted woodlands within the Project Area are most likely used by a variety of migratory and resident passerine, owl, and hawk species which may disperse from areas subjected to lesser disturbance. Some common resident bird species that may be observed in the Project Area are sparrows (various species), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), common grackle (*Quiscalus quiscula*), scissor-tailed flycatcher (*Tyrannus forficatus*), barred owl (*Strix varia*), common crow (*Corvus brachyrhynchos*), American kestrel (*Falco sparverius*), Carolina chickadee (*Parus carolinensis*), and red-tailed hawk (*Buteo jamaicensis*). Mammal species that may utilize appropriate habitats in the Project Area include raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), white-tailed deer (*Odocoileus virginianus*) coyote (*Canis latrans*), bobcat (*Lynx rufus*), eastern cottontail (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), and small rodents. Various species of frogs and turtles may be found in suitable waterbodies, while lizards and snakes may also persist in viable terrestrial habitats within the Project Area. A list of floral and faunal species that were observed during field investigations carried out in 2013 in the Project Area is included on each site observation sheet in Appendix B of the 2014 PAR.

The Project Area is a key resource for regional pollinators. LLELA provides a large, unfragmented landscape surrounded by intensely developing and urbanizing private land. LLELA's location adjacent to Interstate 35 makes it particularly important for migrating monarch butterflies. The Interstate 35 corridor is a priority focus for restoration in the *National Strategy to Promote the Health of Honey Bees and Other Pollinators* (Pollinator Health Task Force 2015).

A typical assemblage of reservoir fish is found within Lewisville Lake. Included are recreationally important species such as channel catfish (*Ictalurus punctatus*), largemouth bass (*Micropterus salmoides*), white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), bluegill (*Lepomis macrochirus*), red-ear sunfish (*L. microlophus*), warmouth (*L. gulosus*), striped bass (*Morone saxatilis*), and white bass (*M. chrysops*). There is also a typical assortment of fish, such as minnows (Family Cyprinidae), shiners

(*Notropis spp.*), gizzard shad (*Dorosoma cepedianum*), and inland silverside (*Menidia beryllina*), necessary to provide food for more desirable species.

Habitat Assessments

The areas evaluated for habitat suitability were the action area, including the construction footprints of proposed features and the sites proposed for borrow materials to support project alterations. These areas included 114.7 acres of savanna (39.4% of the action area), 77.2 acres of grassland (26.5%), 48.1 acres of upland forest (16.5%), 7.6 acres of riparian woodland (2.6%), and 0.3 acre of wetlands (0.1%). The action area also contains 17.7 acres of lacustrine habitat (6.1% of the action area) and 0.5 acre of riverine habitat (0.2%) evaluated in the IBI aquatic study. Finally, the action area includes 25.1 acres of urban development (8.6%) not included in the evaluation.

Table 3.4-1 displays the HSI values and HUs for each habitat type in the action area. The average HSI values for each terrestrial habitat within the action area ranged from 0.19 for wetland to 0.48 for grassland. Each habitat is described below.

Table 3.4-1. Existing HSI and HUs per Habitat Type within the Action Area

Habitat Types	*HSI*	*Baseline HU*
Riparian Woodland	0.45	3.42
Upland Forest	0.30	14.43
Wetland	0.19	0.06
Grassland	0.48	37.06
Savanna	0.29	33.26
Riverine	0.86	0.43
Total	**N/A**	**88.66**

Note: N/A = not applicable. Riverine habitat is described under Section 3.4.4.1, *Aquatic Habitat*.

Riparian Woodlands

Riparian woodlands are typically bottomland hardwoods; however, the action area contains some riparian woodlands that could be classified as upland previously influenced by streams which existed before the construction of the dam. In optimum conditions, this cover type provides food, cover, nesting habitat, and living space to riparian forest dependent species. Riparian forest habitats are essential in maintaining biodiversity and providing important wildlife travel corridors.

Riparian woodlands are primarily located along the various flows, some of which no longer permanently contain water since the completion of the dam. Many of these woodlands are periodically flooded and are predominately composed of American elm, hackberry, pecan, cedar elm, black willow, and bur oak. Other trees species present include eastern red cedar, eastern cottonwood, boxelder (*Acer negundo)*, red mulberry (*Morus rubra)*, and green ash.

The overall HSI value for the riparian woodland within the action area is 0.45 (below average habitat value) with 3.42 HUs.

Upland Forest

Deciduous forests are upland hardwood areas dominated by trees and with a minimum tree canopy cover of 25%. Upland forests provide food, cover, nesting habitat, and living space to upland forest dependent species. Cedar elm, eastern red cedar, post oak, and hackberry dominate this cover type. Other tree species associated with this forest type include eastern cottonwood, green ash, bois d' arc (*Maclura pomifera)*, gum bumelia (*Sideroxylon lanuginosum)*, and Chinaberry. The shrub layer consists of gum bumelia, hackberry, cedar elm, post oak, red mulberry, dogwood (*Cornus florida)*, and coralberry (*Symphoricarops orbiculatus)*.

The overall upland deciduous forest HSI value within the action area is 0.30 (below average habitat value) with 14.43 HUs.

Wetlands

Wetlands in the Project Area are dominated by non-woody vegetation. Wetlands provide food and cover for fish, resident and migratory birds, small mammals, invertebrates, and the predators that feed on these species. Wetlands are important nesting habitat for wading birds and waterfowl. They are comprised primarily of rushes, sedges, wetland grasses, and aquatic plants located along the edges of the reservoir and creeks, and in seasonally flooded areas. Some of these wetlands are permanent, but most are likely seasonal.

The overall wetland HSI for the action area is 0.19 (below average habitat value) with 0.06 HUs.

Grasslands

Grasslands are dominated by grasses, native or introduced, and have a minimum canopy cover of 25%. Grasslands provide open space, a food source for passerines and the eastern cottontail, and cover for escape and nesting by means of tall grass, scattered brush piles, and shrubs for a variety of animals. Red-tailed hawks hunt for prey in open grasslands.

Nearly 40% of the action area grassland is north of Jones Road and considered "improved grassland" on and adjacent to the Lewisville Dam. Improved grasslands have a substantial non-native component, and are frequently mown as part of regular operations and maintenance activities. The remaining unmanaged grasslands are fallow fields also containing a combination of native and introduced grasses, forbs, and trees. Portions of these areas are managed by LLELA for prairie restoration, with activities including periodic prescribed burning and native seeding to reduce encroachment by shrubs, trees, and non-native species.

The overall HSI value for grasslands within the action area is 0.48 (below average habitat value) with 37.06 HUs.

Savanna

Savanna is a non-wetland area with a shrub and/or tree canopy cover between 5-25%, but with a total canopy cover of all vegetation greater than 25%. The area between the trees and shrubs is typically dominated by grasses or other herbaceous vegetation. Savannas provide open space, a food source for passerines and the eastern cottontail, and cover for escape and nesting by means of tall grass, scattered brush piles, and shrubs for a variety of animals.

Unmanaged savannas such as those within the Project Area typically consist of fallow fields also containing a combination of native and introduced grasses, forbs, and trees, but the composition is different from those in the short grass areas.

The overall savanna HSI is 0.29 (below average habitat value) with 33.26 HUs.

3.4.4.3 Fish and Wildlife Management

Fish and wildlife management areas are lands designated as habitat for fish and wildlife or for propagation of such species and where wildlife habitat maintenance or improvement is appropriate. Private or exclusive group use of these lands is not permitted. Vehicles are not allowed, nor any structures not directly related to access or control of access through the area. Fish and wildlife management lands are generally available for selected low-density recreation activities such as hiking, hunting, fishing, nature study, nature photography, wildlife observation, and other related activities. Public access to wildlife management lands are restricted at certain critical periods when wildlife would otherwise be adversely affected, such as during critical breeding, nesting, and spawning periods. Refer to Section 3.9 for additional information regarding recreation within the Project Area.

3.4.4.4 Special Status Species

<u>Federal and State Listed Threatened and Endangered Species</u>

Based on the USFWS Information for Planning and Conservation (IpaC) report obtained for this project, the federally-listed threatened or endangered species known to occur in and around the Project Area include the endangered whooping crane (*Grus americana*) and the interior least tern (*Sternula antillarum*). The piping plover and the red knot also have the potential to occur, but per the IpaC report, these birds need only be considered for wind energy projects and are not likely to be impacted by the current Proposed Action (USFWS 2016b). The IpaC also incorporates the Birds of Conservation Concern, of which 19 species are identified as potentially occurring in the Project Area.

Federally and state listed threatened and endangered species that potentially occur in Denton County are included in Table 3.4-2. Of the seven listed birds in Denton County, two are federally listed and five are state listed. There is one bird species that is a candidate for listing. There are no state- or federally-listed mammals in Denton County. There are three state listed threatened mollusks and two state listed threatened reptiles in Denton County (TPWD 2016).

Table 3.4-2. Denton County Federal and State Threatened and Endangered Species

Species	*Habitat*	*Federal Status*	*State Status*	*Occurrence in the Project Area*
Birds				
American Peregrine Falcon (*Falco peregrinus anatum*)	Year-round resident and local breeder in west Texas, nests on high cliffs, often near water where prey species are most common.		T	Potential migrant.
Bald Eagle (*Haliaeetus leucocephalus*)	Found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; all reservoirs in north Texas are considered potential nesting habitat.		T	Potential as a migrant or winter resident; this species could use the reservoir and river for migration or wintering.
Least Tern (*Sternula antillarum*)	Colonial nesting species adapted to sand and gravel deposition features associated with inland lakes and rivers.	E		Potential as migrant or nesting resident.
Sprague's Pipit (*Anthus spragueii*)	Only in Texas during migration and winter from mid-September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in	C		Potential migrant.

Table 3.4-2. Denton County Federal and State Threatened and Endangered Species

Species	*Habitat*	*Federal Status*	*State Status*	*Occurrence in the Project Area*
	coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.			
White-faced Ibis (*Plegadis chihi*)	Prefers freshwater marshes, sloughs, and irrigated rice fields; nests in marshes, in low trees, in bulrushes or reeds, or on floating mats.		T	Potential migrant.
Whooping Crane (*Grus 3-27mericana*)	Potential migrant via plains throughout most of the state to the coast; winters in Texas coastal marshes in Aransas, Calhoun, and Refugio counties.	E	E	Potential migrant.
Wood Stork (*Mycteria 3-27mericana*)	Forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water; usually roosts in tall snags.		T	Potential migrant.
Mollusks				
Louisiana Pigtoe (*Pleurobema riddellii*)	Streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins.		T	Potential; historically this species occurred in the Trinity River.
Sandbank Pocketbook (*Lampsilis satura*)	Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River.		T	Potential; dead specimen identified in Lewisville Lake in 1990; live specimen found downstream in the Trinity River in 2013.
Texas Heelsplitter (*Potamilus amphichaemus*)	Quiet waters in mud or sand and in reservoirs. Sabine, Neches, and Trinity River basins.		T	Potential; the Elm Fork and Lewisville Lake provide suitable habitat for this species.
Reptiles				
Texas Horned Lizard (*Phrynosoma cornutum*)	Open, arid, and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush, or scrubby trees.		T	Low potential; this species is not likely to occur in the Project Area. Preferred soils are not likely to occur within the Project Area and no harvester ants were observed during site visits.
Timber/Canebrake Rattlesnake (*Crotalus horridus*)	Swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland, limestone bluffs, sandy soil or black clay. Prefers dense ground cover, i.e., grapevines or palmetto.		T	Potential; suitable habitat includes dense bottomland hardwood habitat within the Project Area.

Notes: E = Endangered, T = Threatened, C = Candidate.

Bald Eagle

The bald eagle was delisted as a threatened species by the USFWS on August 8, 2007. A final post-delisting monitoring plan is available (USFWS 2009). Eagle management continues under the MBTA and the Bald and Golden Eagle Protection Act. The bald eagle is a state-listed threatened species (TPWD 2014). Bald eagles are primarily found near rivers and large lakes. They nest in tall trees (40-120 feet) or on cliffs near water. All reservoirs in north central Texas are considered potential nesting habitat (TPWD 2006). The Project Area consists of suitable habitat for both wintering and foraging/roosting throughout the Lewisville Lake project lands. Although not located within the immediate Project Area, the Texas Natural Diversity Database (TXNDD) search noted the occurrence of nesting bald eagles just north of the Project Area on Lake Ray Roberts (TPWD 2016). In early November 2010, Oncor Electric and LLELA installed five bald eagle/osprey (*Pandion haliaetus*) nesting platforms on project lands south of Lewisville Dam. To date, only ospreys have been observed by LLELA staff utilizing the platforms for perches and feeding.

Potential Migrating Special Status Species

The interior least tern was federally listed as endangered on June 27, 1985 and is listed as endangered by the state of Texas (USFWS 1985; TPWD 2016). No critical habitat has been designated for this species and the recovery plan was finalized in 1990 (USFWS 1990). The interior least tern is the smallest North American tern. They are white with gray back and wings, a black crown, white forehead, and a slightly forked tail. They eat small fish and crustaceans and when breeding forage within a few hundred feet of the colony. The interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers and streams in Texas from May through August. Nesting areas are ephemeral, changing as sandbars form, move, and become vegetated. Because natural nesting sites have become sparse, interior least terns have nested in atypical/non-natural areas, which provide similar habitat requirements (USFWS 2016b). For example, one colony has been nesting for several years at the Southside Wastewater Treatment Plant in Dallas. Non-natural nesting sites include sandpits, exposed areas near reservoirs, gravel levee roads, dredge islands, gravel rooftops, and dike-fields. In recent years, terns have been utilizing artificial habitat more frequently within the Dallas-Fort Worth Metroplex area with small colonies being established in highly developed areas. Although TPWD no longer lists the interior least tern as occurring in Denton County, it has historically been known to forage within the Project Area, and during the flood event in 2015 approximately one dozen least terns were attempting to nest on a flooded road in Westlake Park, approximately 8 miles north of the Project Area. Active nesting colonies occur in the Texas Panhandle on the Red and Canadian River systems and in south Texas along the Rio Grande.

Other potential migrants through Denton County include the American peregrine falcon, white-faced ibis, whooping crane, wood stork, Sprague's pipit, and red knot. These species could utilize the Project Area as a stopover location during migration for foraging/roosting habitat (TPWD 2016). The Project Area is located on the outside fringe of the primary migratory flyway for many of these species; however, the potential for stopover exists, especially within the grasslands, wetlands, and reservoir. The use of Lewisville Lake as migratory habitat would be seasonal and temporary in nature if stopovers occurred by any of these species. During the summer of 2013, approximately seven whooping cranes were observed for an extended period utilizing habitat in the upper regions of the lake. These birds were part of the Louisiana experimental flock. It is unknown at this time why these individuals deviated from their original flight paths to temporarily take up residence at Lewisville Lake.

Mollusks

According to the TXNDD, the Texas heelsplitter has been found to occur at numerous locations across Lewisville Lake (TPWD 2016). Suitable habitat for the sandbank pocketbook exists in Lewisville Lake and in the Elm Fork Trinity River, and a single live individual was identified in the river channel in 2013. This individual is only the third specimen found in the Lewisville Lake/Elm Fork Trinity River over the past 40 years; it is the only documented live specimen. The Elm Fork Trinity River and Lewisville Lake provide suitable habitat for the Louisiana pigtoe as well. These mussel species have been petitioned for federal listing (TPWD 2016). Louisiana pigtoe and Texas heelsplitter had a USFWS positive 90-day finding, but the 12-month finding will not be made until after 2016 (USFWS 2011).

Timber Rattlesnake

The timber rattlesnake is listed as threatened by the state of Texas (TPWD 2016). Preferred habitat for the timber rattlesnake exists in forested areas with dense ground cover. The distribution of the timber rattlesnake stretches from the east coast westward into Texas, and as far north as New England. In the southern portions of its range, this species prefers to make its den in somewhat swampy, wetland habitats. The Dallas-Fort Worth Metroplex represents the far western edge of its range, and is characterized by drier conditions than generally preferred by this snake. Populations tend to be higher in eastern Texas where greater concentrations of wetlands and humid forests are found. Forested areas located near permanent water sources are also used, as fallen debris from trees can act as refuge for the rattlesnake. The timber rattlesnake is a shy animal that prefers to live in areas with high amounts of cover and available refuge. Within the Project Area, possible habitat includes bottomland hardwoods located throughout the Lewisville Lake project lands.

State of Texas Species of Concern

Seven TPWD species of concern that may occur in Denton County are listed in Table 3.4-3 and include three birds, one mammal, one reptile, and two plants (TPWD 2016). Nine of the ten species have the potential to occur or transit through the Project Area and are described in the following paragraphs.

Table 3.4-3. Denton County Species of Concern

Species	*Habitat*	*Occurrence in the Project Area*
Birds		
Arctic peregrine falcon (*Falco peregrinus tundrius*)	Migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.	Potential migrant.
Henslow's sparrow (*Ammodramus henslowii*)	Wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking.	Potential migrant.
Western burrowing owl (*Athene cunicularia hypugaea*)	Open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows.	Potential migrant.
Mammals		
Plains spotted skunk (*Spilogale putorius interrupta*)	Generalist; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.	Potential; wooded, brushy areas and prairie habitats provide suitable habitat for this species within the Project Area.
Reptiles		
Texas garter snake (*Thamnophis sirtalis annectens*)	Wet or moist microhabitats are conducive to the species occurrence, but the species is not necessarily restricted to them; hibernates underground or in or under surface cover.	Potential; suitable habitat consisting of wet or moist microhabitats exist within the Project Area for this species.
Plants		
Glen Rose yucca (*Yucca necopina*)	Grasslands on sandy soils and limestone outcrops.	Not likely due to lack of habitat.
Topeka purple-coneflower (*Echinacea atrorubens*)	Occurring mostly in dry soils in tallgrass prairie of the southern Great Plains, in blackland prairies but also in a variety of other sites like limestone hillsides.	Not likely due to lack of habitat.

Potential Migrating Species of Concern

The Artic peregrine falcon, Henslow's sparrow, and Western burrowing owl are potential migrants through Denton County. These species could utilize the Project Area as a stopover location during migration for foraging/roosting habitat (USFWS 2016b). The Project Area is located on the outside fringe of the primary migratory flyway for many of these species; however, the potential for stopover exists. The use of the Project Area as migratory habitat would be seasonal and temporary in nature if stopovers occurred by any of these species.

Plains Spotted Skunk

The plains spotted skunk prefers forested or brushy habitats, which provide cover and potential den sites. The species is sometimes seen foraging in more open areas, but utilizes abandoned burrows, brush piles, or hollow logs when bearing young. Range information for this species is incomplete, but the species is known throughout the Midwest. There is potential for the plains spotted skunk to occur in the Project Area.

Texas Garter Snake

The Texas garter snake is a subspecies of the common garter snake. It has a limited distribution in eastern and central Texas and a disjunct population in Kansas and is most abundant in the central Texas portion of its range. This species prefers marshy areas and those associated with permanent sources of water (TPWD 2016). The Texas garter snake potentially occurs in the Project Area. The TXNDD search sited an occurrence of the Texas garter snake within the southwestern portion of the Project Area, including areas below Lewisville Dam (TPWD 2016).

Birds of Conservation Concern

The USFWS published the *Birds of Conservation Concern (BCC) 2008* in December 2008. The goal of the BCC is to identify the migratory and non-migratory bird species, beyond those already designated as federally listed, that represent the highest conservation priorities (USFWS 2008). There are 19 species of birds on the BCC list that may utilize the habitats or occur within the general vicinity of the Project Area. The species are as follows: Little blue heron (*Egretta caerulea*), Swallow-tailed kite (*Elanoides forficatus*), Bald eagle, Peregrine falcon, Black rail (*Laterallus jamaicensis*), Upland sandpiper (*Bartramia longicauda*), Long-billed curlew (*Numenius americanus*), Hudsonian godwit (*Limosa haemastica*), Buff-breasted sandpiper (*Tryngites subruficollis*), Red-headed woodpecker (*Melanerpes erythrocephalus*), Scissor-tailed flycatcher (*Tyrannus forficatus*), Loggerhead shrike (*Lanius ludovicianus*), Bell's vireo (*Vireo bellii*), Sprague's pipit, Swainson's warbler (*Limnothlypis swainsonii*), Henslow's sparrow, Harris's sparrow (*Zonotrichia querula*), Smith's longspur (*Calcarius pictus*), and Orchard oriole (*Icterus spurius*).

3.4.4.5 Invasive Species

EO 13112, dated February 3, 1999 directs federal agencies to expand and coordinate their efforts to combat the introduction and spread of invasive species (i.e., noxious plants and animals not native to the U.S.). Non-native flora and fauna can cause significant changes to ecosystems, upset ecological processes and relationships, and cause harm to our nation's agricultural and recreational sectors. Numerous factors can facilitate the spread of plant and animal species outside their natural range, both domestically and internationally. Those species that are likely to harm the environment, human health, or economy are of particular concern.

Until the National Invasive Species Council defines an approved national list of invasive plants, known invasive plants are defined as those on the official noxious weed list of the state in which the activity occurs. In Texas, the Texas Department of Agriculture (TDA) defines and regulates prohibited and restricted noxious weed seeds in accordance with Texas Agricultural Code (TAC), Chapter Section 61.008 (Texas Seed Law). Consistent with TAC Title 4, Part 1, Chapter 9, Subchapter T, Section 19.300(a), noxious and invasive plant species that are known to occur in the Project Area include alligatorweed (*Alternanthera philoxeroides*), hydrilla (*Hydrilla verticillata*), Chinese tallow (*Triadica sebifera*), Salvinia (*Salvinia spp.),* Eurasian watermilfoil (*Myriophyllum spicatum*), water hyacinth (*Eichhornia crassipes*), rooted water hyacinth (*Eichhornia azurea*), and salt cedar (*Tamarix spp.*).

Additional invasive species are listed by the Texas Invasive Plant and Pest Council (TIPPC) (TIPPC 2016). Other invasive plant species known to occur within the Project Area defined as invasive by the TIPPC include bastard cabbage (*Rapistrum rugosum*), Chinaberry, Chinese privet, Japanese privet

(*Ligustrum japonicum*), parrot feather, johnsongrass, King Ranch bluestem, Dallisgrass (*Paspalum dilatatum*), Nodding thistle, and sweet scabiosa.

Other common invasive plant species which occur in Texas and could occur in the Project Area include Japanese honeysuckle (*Lonicera japonica*), Pyracantha spp., water lettuce (*Pistia stratiotes*), water spinach (*Ipomoea aquatic*), Asian jasmine (*Trachelospermum asiaticum*), and Elaeagnus spp. Aquatic invasive plants are especially problematic because they can slow flow and lead to an increased flood risk.

Invasive fish and shellfish including crayfish, mussels, and crabs are also a problem in Texas (TPWD 2011). Zebra mussels (*Dreissena polymorpha*), which threaten native habitats and species as well as water supplies, were documented in Lake Texoma in 2008, approximately 75 miles north of the Project Area. In 2010, zebra mussels were found in Ray Roberts Lake in the Trinity River Basin, and have rapidly spread with occurrences in Lewisville Lake within the Study Area, Bridgeport Reservoir, Lavon Lake, Waco Lake, and Belton Lake within the state (TPWD 2011). Currently, Lewisville Lake is considered high risk for the establishment of zebra mussels. In addition to zebra mussels, Asian clams (*Corbicula spp.)* occur throughout the Project Area. Feral pigs (*Sus scrofa*) and nutria (*Myocastor coypus*) are invasive mammals known to occur within the Study Area.

Close coordination regarding the establishment and spread of zebra mussels within the Study Area began in 2009 with USFWS, TPWD, USGS, water partners, local stakeholders, and representatives of academia. Efforts by all parties continue to be directed at public education, early detection, law enforcement, vessel decontamination, and steps to avoid, minimize, and mitigate the risks and impacts as a result of the presence of zebra mussels.

Current invasive species control efforts within the Project Area include several entities. TPWD conducts control efforts for Chinese privet within Lewisville Lake project parklands they lease from the USACE located in the Ray Roberts Lake Greenbelt. The Lewisville Lake project office is currently working on plans for Chinese privet and Johnson grass control efforts. Chinese privet control will be directed toward various parks, fish and wildlife area designations, and environmentally sensitive areas. Johnson grass control will focus on areas associated with the dam, outlet structures, spillways, office compound, and other priority locations as deemed appropriate. Some Chinese tallow control and removal efforts have occurred or will occur through required mitigation on Lewisville Lake project lands by the Texas Department of Transportation (TxDOT). The mitigation efforts are required due to impacts of various roadway or recreation projects crossing project lands within the Project Area. The mitigation efforts are managed by LLELA organizations. LLELA organizations perform numerous control efforts on project lands below the Lewisville Dam including Chinese privet removal efforts within the forested areas, *Salvinia molesta* control within the Bittern Marsh, parrot feather control within a drainage exiting the LAERF facilities, and Johnson grass control in the prairie restorations areas. Additionally, LLELA organizations continuously employ herbicide treatments, manual removal, or controlled burns within restoration areas (primarily prairie restoration locations) to control King Ranch Bluestem, bastard cabbage, pincushions, and nodding thistle.

3.5 PUBLIC HEALTH AND SAFETY

3.5.1 Definition of Resource

This section examines those elements of the Study Area that may be at risk of harm from a flood event, as well as the emergency response systems in place to respond to such events. Intense, heavy rainfall or dam failure that could lead to flooding has the ability to cause property damage and destruction, life-threatening injuries, and the possibility of loss of life for those affected.

3.5.2 Methodology

Public health and safety is evaluated in terms of initial risk, emergency response, and communication of emergency procedures to the potentially affected population. The potentially affected population consists of the public at risk of harm from flooding, including those working on project implementation and construction/modification to the dam. The ROI for public safety is the Study Area (refer to Figure 1-1).

The USACE conducted a Base Condition Risk Assessment (BCRA) evaluating risk to life and property associated with extreme, catastrophic flood events in the Study Area. The BCRA used models to quantify potential damage (including loss of life) from the most likely to occur extreme catastrophic flood events.

3.5.3 Regulatory Framework

The Disaster Mitigation Act of 2000 (Public Law 106-390) and the FEMA Hazard Mitigation Planning and Hazard Mitigation Grant Program Interim Final Rule (44 CFR 201.6) requires all local jurisdictions nationwide to draft a FEMA-approved hazard mitigation plan to ensure eligibility for pre-disaster and post-disaster mitigation funds.

The BCRA evaluates risk in accordance with the "Tolerable Risk Guidelines" in ER 1110-2-1156. Based on this guidance, tolerable risks are:

- Risks that society is willing to accept to secure certain benefits,
- Risks that society does not regard as something it might ignore,
- Risks that society is confident are being properly managed by the owner, and/or
- Risks that the owner keeps under review and reduces still further if and as practicable.

Risk may also be quantified as "broadly acceptable." "Broadly acceptable risk" is generally regarded as insignificant and adequately controlled. The USACE evaluates risk as it relates to dams with respect to the annual probability of failure, life safety risk, economic risk, environmental or other risk, and additional, context-specific additional considerations (USACE 2016).

3.5.4 Existing Conditions

The population of Texas is growing at twice the national rate (U.S. Census Bureau 2011), and the City of Lewisville and Denton County in general continues to increase in population (U.S. Census Bureau 2015). Over the next 50 years, there is a chance of major storm events occurring in Denton County, Texas.

In the Lewisville Dam Study Area and vicinity, public health and safety topics of interest include provision of protection and health emergency services; landslides; flooding; degraded air quality; traffic obstructions to emergency response; noise and vibration; recreation safety; vector-borne diseases; water-borne threats; and homeland security. Many of these topics are addressed in other sections of this EA, and are therefore not discussed in this section.

These include the following:

- Landslides (Section 3.2)
- Degraded air quality (Section 3.6)
- Water-borne threats (Section 3.3)
- Traffic obstruction to emergency response (Section 3.5)

Those health and safety topics of interest in the Study Area and vicinity not addressed in other sections are discussed below.

3.5.4.1 Lewisville Dam

Lewisville Dam has a good performance history, and it is regularly inspected and monitored closely by the USACE.

Current safety protocols in place include:

- Daily inspections of any potential mechanical and/or project performance issues with follow-on immediate reporting to the District's dam safety specialists.
- Annual inspection of critical operating features which include the spillway and outlet features.
- Periodic (every 5 years) detailed inspection of structural integrity, and operational adequacy of those components whose failure to operate properly could impair the operational capability of the structure.

In the event of local flooding from heavy rainstorms, hazards could occur at Lewisville Lake and vicinity. Communities surrounding the lake as well as Highway 35E could be at risk of property damage as well as physical harm. Other flooding risks that could occur could be as a result of deficiencies in dam function.

Public health and safety can be at risk if the dam is not able to perform at 100% efficiency. FEMA has federal guidelines in place for implementing risk-informed decision making in dam safety. The term "risk", when used by FEMA in the context of dam safety, is comprised of three parts: (1) the likelihood of occurrence of a load (i.e., flood, earthquake), (2) the likelihood of an adverse structural response (i.e., dam failure, damaging spillway discharge), and (3) the magnitude of the consequences resulting from the adverse event (i.e., environmental and economic damages, loss of life) (FEMA 2015).

The USACE similarly defines risk as a measure of the probability and severity of undesirable consequences or outcome. As described in Sections 1.2.2.5 and 1.3.2, the USACE categorized Lewisville Dam as DSAC II in December 2008. Dams in this class are described as "failure initiation foreseen or very high incremental risk" under normal operations. The key findings of this screening level review highlighted the following items of concern:

- Foundation Seepage and Piping - found to be "Probably Inadequate" at a "Normal Loading (less than 10-year flood), "Unusual Loading for at 10- to 300-year flood, and "Inadequate" at "Extreme Loading (300-year to PMF) for Foundation Seepage and Piping.
- Spillway – Erodibility - At "Extreme Loading (300-year to PMF)," spillway erodibility was reported to be "Probably Inadequate."
- Embankment Foundation Stability - At "Extreme Loading (300-year to PMF)," stability of the embankment foundation was reported to be "Probably Inadequate."

Seepage

Lewisville Dam is more than 55 years old and has a history of seepage and stability concerns. Seepage at Lewisville Dam was first reported during the spring flooding of 1957. Since then, seepage has been persistent in three separate areas along the downstream toe of the embankment, and was first documented in Periodic Inspection Report No. 1, dated November 1969. Seepage from the three seepage areas is collected and monitored by numerous seepage collector systems including drain trenches and relief wells. The original seepage collection systems were installed in 1980 – 1981, in conjunction with the construction of the downstream berms and installation of relief wells the year earlier. Although these systems are functioning, monitoring has not been adequate. Since installation of the relief wells and seepage collection system was complete, there have been four spillway flow events. However, because frequent readings of piezometers, seepage collector systems, and relief wells were not made as the pool levels rose and fell during those events, sufficient data with which to make technically defensible conclusions with respect to project response to pool excursions and associated precipitation is not available. Due to the seepage concern, the evacuation of floodwater stored in Lewisville Lake is given priority over the releases from nearby Grapevine and Ray Roberts Lakes.

Spillway Erosion

Based on the hydrology records available during the planning and design of the project, Lewisville Dam was built with what was thought to be a 2.9% Annual Chance Exceedance (ACE) for spillway overtopping. However, in its 56 years of operation, water has gone over the spillway seven times and has experienced relatively long durations of flow. The highest pool elevation recorded was 536.9 feet in 2015. This elevation is approximately 5 feet over the spillway and it produced an uncontrolled flow of 21,000 cfs. Table 3.5-1 identifies the dates and durations of spillway flow.

Table 3.5-1. Lewisville Dam Dates and Durations of Spillway Flow

Dates above Spillway Crest	*Peak Elevation (feet)*	*Time Above El. 532.0 feet*
May 25 – June 19, 1957	535.5	26 days
October 15 – November 21, 1981	536.5	38 days
May 14 – July 4, 1982	534.9	52 days
June 15 – 26, 1989	532.3	12 days
April 30 – May 28, 1990	536.7	29 days
July 1 – 20, 2007	534.0	20 days
May 24 – July 10, 2015	536.9	48 days

When Ray Roberts Dam was constructed in 1987, the conservation pool at Lewisville Lake was raised from elevation 515.0 feet to 522.0 feet. A period of record simulation, which simulates the operation of Ray Roberts in conjunction with the raised conservation pool at Lewisville Lake, was performed by the Fort Worth District using inflow records dating back to 1940. Based on this simulation, Lewisville Lake would have exceeded the spillway crest seven times in the past 73 years, equating to an ACE of approximately 10%.

3.5.4.2 Emergency Services

Police protection for citizens and visitors of Lewisville Lake is provided by the City of Lewisville and City of The Colony. The departments are capable of responding to all emergency incidents throughout both cities that require police intervention, including natural disasters.

3.5.4.3 Emergency Management

Municipal Emergency Management and Disaster Preparedness

The Lewisville Office of Emergency Management serves residents, visitors, and businesses of Lewisville through four phases: Preparedness, Mitigation, Response, and Recovery. Known hazards that may affect the City of Lewisville include severe weather, hazardous materials, epidemics/pandemics, gas wells/pipelines, and terrorism. The City's emergency management evaluates and designs plans for the City's response to emergencies and disasters, conducts outreach and provides educational presentations to residents and businesses through the KnoWhat2Do program. Further, the City maintains and tests its Outdoor Warning System and Emergency Notification System, Everbridge (City of Lewisville 2015b).

The City of The Colony does not have an emergency notification system but the City is located within Denton County, which does have a CodeRed emergency notification system in place by which the residents of The Colony and other smaller cities within Denton County can choose to be notified. The notification system provides alerts for multiple addresses and phones utilizing text, email, and phone for information on severe weather (Denton County 2016).

USACE

The USACE issues periodic closures of Lewisville Lake to boaters to ensure public safety. Facility closure reports are posted on the USACE website, listing facilities that are closed due to flooding conditions/damages, seasonal closures, maintenance and construction activities, low lake levels, etc. (USACE 2016b).

3.6 AIR QUALITY

3.6.1 Definition of Resource

Existing air quality at a given location can be described by the concentrations of various pollutants in the atmosphere. The USEPA defines air quality as the ambient air concentrations of specific pollutants determined by the USEPA to be of concern to the health and welfare of the public. These "criteria pollutants" include ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$), particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}), and lead (Pb).

The ROI for air quality is the Metropolitan Dallas-Fort Worth Air Quality Control Region (AQCR).

3.6.2 Methodology

3.6.2.1 Criteria Pollutants

Ozone. Ground-level O_3 (commonly known as "smog") created by chemical reactions between volatile organic compound (VOCs) and oxides of nitrogen (NO_x) in the presence of sunlight. Breathing ozone can trigger a variety of health problems including chest pain, coughing, throat irritation, and airway inflammation. It can also reduce lung function and harm lung tissue (USEPA 2016a).

Carbon Monoxide. CO is a colorless, odorless, poisonous gas emitted from combustion processes. The majority of CO emissions to ambient air come from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues (USEPA 2016a).

Nitrogen Dioxide. NO_2 is a highly reactive gas produced primarily from the burning of fossil fuels. NO_2 forms quickly from emissions of cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system (USEPA 2016a).

Sulfur Dioxide. SO_2 emissions are primarily from fossil fuel combustion at power plants (73%) and other industrial facilities (20%). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur containing fuels by locomotives, large ships, and non-road equipment. SO_2 is linked with a number of adverse effects on the respiratory system (USEPA 2016a).

Particulate Matter. "Particulate matter," also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The size of particles is directly linked to their potential for causing health problems. USEPA is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. USEPA groups particle pollution into two categories: (1) "Inhalable coarse particles," such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter; and (2) "Fine particles," such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air (USEPA 2016a).

Lead. At the national level, major sources of lead in the air are ore and metals processing and piston-engine aircraft operating on leaded aviation fuel. Other sources are waste incinerators, utilities, and lead-acid battery manufacturers. The highest air concentrations of lead are usually found near lead smelters. Once taken into the body, lead distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, lead can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The lead effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (e.g., high blood pressure and heart disease) in adults (USEPA 2016a).

Criteria pollutant emissions affecting air quality in a given region are characterized as being from either stationary or mobile sources. Stationary sources of emissions, also known as point sources, include emissions from smokestacks, flarestacks and vents, as examples. Mobile sources of emissions, also termed non-point sources, include emissions from vehicles, construction equipment, rail, and aircraft.

Air quality for a region is a function of the type and concentration of pollutants in the atmosphere, the size and topography of the air basin, and local and regional meteorological influences. The significance of a pollutant concentration in a region or geographical area is determined by comparing it to federal and, where applicable, state ambient air quality standards.

3.6.2.2 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. These emissions occur from natural processes and human activities. The accumulation of GHGs in the atmosphere can influence the earth's temperature. Predictions of long-term environmental impacts due to global climate change include sea level rise, changing weather patterns with increases in the severity of storms and droughts, changes to local and regional ecosystems including the potential loss of species, and a significant reduction in winter snow pack. In Texas, predictions of these effects include exacerbation of air quality problems, increased storm frequency, an increased drought frequency, and an increase in the number of high temperature days (Shafer et. Al. 2014).

Federal agencies are, on a national scale, addressing emissions of GHGs by reductions mandated in federal laws and Eos, most recently, EO 13693, *Planning for Federal Sustainability in the Next Decade.* Several states have promulgated laws as a means to reduce statewide levels of GHG emissions. In particular, Texas Senate Bill 184 (September 1, 2009), required the State Comptroller to develop strategies to reduce GHG emissions by December 31, 2010, and the Texas Emission Reductions Plan, established in 2001, provides incentives to reduce vehicle and equipment emissions and improve and maintain air quality in Texas (TCEQ 2016a). The Texas State Legislature is considering Senate Bill 12, which would provide funding for alternative fuel vehicle fleets for governmental entities (LegiScan 2015). In addition, the City of Dallas initiated the "Green Dallas" program in 2005, which includes initiatives to reduce GHG emissions from both municipal and private sectors of the city of Dallas. The City committed to purchasing 50% of its electricity from wind energy sources in 2014 (Green Dallas 2016). Impacts associated with GHG emissions are discussed in a cumulative context in Section 4.11.1, *Regulatory Framework*.

3.6.3 Regulatory Framework

3.6.3.1 Federal Requirements

Under the authority of the Clean Air Act (CAA), the USEPA has established ambient air quality standards to protect public health and welfare, with an adequate margin of safety. These federal standards, the National Ambient Air Quality Standards (NAAQS), are defined in terms of concentration (e.g., part per million [ppm], parts per billion [ppb], micrograms per cubic meter [$\mu g/m^3$]) determined over various periods of time (averaging periods). The TCEQ has adopted the NAAQS, which are presented in Table 3.6-1.

Short-term standards (1-hour, 3-hour, 8-hour, or 24-hour periods) are established for pollutants with acute health effects and may not be exceeded more than once a year. Long-term standards (3-month, annual periods) are established for pollutants with chronic health effects and may never be exceeded.

Table 3.6-1. National Ambient Air Quality Standards

Air Pollutant [Final Rule citation]	*Averaging Time*	*NAAQS*	
		Primary	*Secondary*
Ozone (O_3) *[73 FR 16436, Mar 27, 2008]* *[80 CFR 65292, Oct 26, 2015]*	8-hour	0.070 ppm (2015 standard)	Same as Primary Standard
Carbon Monoxide (CO) *[76 FR 54294, Aug 31, 2011]*	8-hour 1-hour	9 ppm 35 ppm	- -
Nitrogen Dioxide (NO_2) *[75 FR 6474, Feb 9, 2010]* *[61 FR 52852, Oct 8, 1996]*	Annual Average 1-hour	53 ppb 100 ppb	Same as Primary Standard -
Sulfur Dioxide (SO_2) *[75 FR 35520, Jun 22, 2010]* *[38 FR 25678, Sept 14, 1973]*	1-hour 3-hour	75 ppb -	- 0.5 ppm
Particulate Matter (PM_{10}) *[78 FR 3086, Jan. 15, 2013]*	24-hour	150 µg/m^3	Same as Primary Standard
Particulate Matter ($PM_{2.5}$) *[78 FR 3086, Jan. 15, 2013]*	Annual Average 24-hour	12 µg/m^3 35 µg/m^3	15 µg/m^3 Same as Primary Standard
Lead (Pb) *[73 FR 66964, Nov 12, 2008]*	Rolling 3-month Average	0.15 µg/m^3	Same as Primary Standard

Notes: FR = Federal Register; - = no standard established.
Source: USEPA 2015b.

The USEPA designates areas of the U.S. as having air quality equal to or better than the NAAQS (attainment) or worse than the NAAQS (nonattainment), based on measured ambient criteria pollutant data. Upon achieving attainment, areas that were previously in nonattainment are designated maintenance status. Areas are designated as unclassifiable for a pollutant when there is insufficient ambient air quality data for the USEPA to form a basis for attainment status; unclassifiable areas are treated similar to areas that are in attainment of NAAQS.

The General Conformity Rule (GCR) was established under Section 176I(4) of the CAA and delineates certain statutory requirements for federal agencies to demonstrate conformity of any proposed actions with the State Implementation Plan (SIP) or Tribal Implementation Plan for attainment of the NAAQS. The GCR establishes *de minimis,* emission levels in tons per year based on the severity of an area's air quality problem. The exceedance of a *de minimis* threshold requires a conformity determination. In 1993, the USEPA issued the initial GCR. The GCR was substantially revised in 2010 to improve the process federal entities use to demonstrate that their actions would not contribute to a NAAQS violation. Under the GCR, certain actions are exempted from conformity determinations, while others are presumed to be in conformity if total project emissions are below *de minimis* levels (40 CFR 93.153). Total project emissions include both direct and indirect emissions that can be controlled by a federal agency. Any new project that may lead to nonconformance or to a violation of the NAAQS requires a conformity analysis before initiating the action. The general conformity requirements apply only in nonattainment and maintenance areas.

3.6.3.2 State and Local Requirements

Through the CAA Amendments of 1990, the USEPA requires each state with nonattainment designations to develop a SIP designed to eliminate or reduce the severity and number of NAAQS violations, with an underlying goal to bring state air quality conditions into (and maintain) compliance with the NAAQS by specific deadlines. The SIP is the primary means for the implementation, maintenance, and enforcement of the measures needed to attain and maintain the NAAQS in each state. The USEPA delegates authority to the TCEQ Office of Air Quality for monitoring and enforcing air quality regulations in Texas. The TCEQ, may adopt other, more stringent, air quality standards than those of the USEPA; however, the TCEQ observes the same air quality standards as the USEPA.

3.6.4 Existing Conditions

3.6.4.1 Attainment Status

The TCEQ regulates the Metropolitan Dallas-Fort Worth AQCR (40 CFR 81.39), by authority of the USEPA (Region 6), and promulgated in the Texas SIP. Dallas is in attainment for all criteria air pollutants except O_3 for which the Dallas area is designated as moderate nonattainment for the 2008 8-hour standard (USEPA 2016b). The applicable criteria pollutant *de minimis* levels are 100 tons/year for VOCs and NO_x (40 CFR 93.153). VOCs and NO_x are precursors to the formation of O_3.

The Dallas-Fort Worth O_3 Nonattainment Area consists of the following 10 counties: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise (USEPA 2016c). The attainment deadline for the 2008 8-hour O_3 Dallas-Fort Worth moderate nonattainment area is July 20, 2018 with a 2017 attainment year (TCEQ 2015).

On April 27, 2016, TCEQ adopted the Dallas-Fort Worth Area Redesignation Substitute SIP Revision for the One-hour and 1997 Eight-Hour Ozone NAAQS (Non-Rule Project No. 2015-002-SIP-NR). The SIP revision formally documents the anti-backsliding obligations for the revoked one-hour and revoked 1997 8-hour O_3 NAAQS and ensures that the substance of the redesignation requirements is met for the Dallas-Fort Worth area. This redesignation substitute takes the place of a redesignation request and maintenance plan, which the USEPA would require for a standard that has not been revoked (TCEQ 2016b).

3.6.4.2 Emission Monitoring Data

The TCEQ maintains air quality monitoring information, including real-time monitoring and monthly and yearly summary reports. The nearest monitoring location within the Study Area is the Hinton Street Monitoring Station (TCEQ 2016c). Table 3.6-2 presents the available representative monitoring data for criteria pollutants from this station.

Table 3.6-2. Representative Air Quality Data for the Study Area (2013-2015)

Criteria Pollutant	*2013*		*2014*		*2015*	
	Yearly Average	*Yearly Maximum*	*Yearly Average*	*Yearly Maximum*	*Yearly Average*	*Yearly Maximum*
O_3 *measured in ppb*	28	101	26	90	27	100
CO *measured in ppm*	0.2	2.0	0.2	1.6	0.2	1.8
$PM_{2.5}$ *measured in μg/m³*	12.9	56	9.9	110	10	86
PM_{10} *measured in μg/m³*	25.6	181	27.6	717	23.3	172.8
SO_2 *measured in ppb*	0.2	7.5	0.3	6.4	0.3	5.7
NO_2 *measured in ppb*	11.6	63.4	10.5	57.3	9.4	57.7

Notes: Data from the Hinton Street Monitoring Station C401/C60/AH161. Monitoring data not available for VOCs.
Source: TCEQ 2015d.

3.6.4.3 Major Emission Sources

Emissions in the Study Area come from a variety of stationary and mobile sources. Emission sources include vehicles, aircraft, on-going construction activities, and industrial operations. For example, there are several industrial facilities along and near the Trinity River that contribute to the ambient air quality of the region. These facilities include, but are not limited to, chemical plants, cement plants, semi-conductor facilities, printing operations, and oil and gas facilities.

Approximately 70% of the Dallas-Fort Worth region's air pollution comes from mobile sources such as cars, trucks, airplanes, construction equipment, and lawn equipment. The majority of pollutants emitted from motor vehicles include VOCs, NO_x, CO, PM_{10}, and $PM_{2.5}$. The largest regional sources of VOCs and NO_x emissions are non-road vehicles (construction equipment, airplanes, and locomotives) and on-road (cars and trucks) (TCEQ 2011).

The City of Dallas is implementing several initiatives to improve air quality and reduce O_3 levels, including green fleet/vehicles, ordinances, commute solutions, and outreach programs. The Dallas-Fort Worth region has experienced a steady decline in NO_x levels in the past decade, most notably from reductions in emissions from stationary sources (stack) emissions, cleaner cars and construction equipment, and cleaner fuels (Green Dallas 2012).

3.7 CULTURAL RESOURCES

3.7.1 Definition of Resource

Cultural resources include buildings, structures, sites, districts, and objects eligible for or included in the NRHP, cultural items, Indian sacred sites, archaeological artifact collections, and archaeological resources (Instruction 4000.35A, USACE *Cultural Resources Program*). Cultural resources can be divided into three major categories: archaeological resources, architectural resources, and traditional cultural resources.

- Archaeological resources are material remains of past human life that are capable of contributing to scientific or humanistic understanding of past human behavior, cultural adaptation, and related topics through the application of scientific or scholarly techniques. Archaeological resources can include village sites, temporary camps, lithic scatters, roasting pits/hearths, milling features, rock art (both petroglyphs and pictographs), rock features, and prehistoric burials.
- Architectural resources include real properties, sites, buildings, structures, works of engineering, industrial facilities, fortifications, historic-age cemeteries with above ground markers and landscapes.
- Traditional cultural resources are tangible places or objects that are important in maintaining the cultural identity of a community or group and can include archaeological sites, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals.

3.7.2 Methodology

Historic properties are cultural resources that meet one or more criteria for eligibility for nomination of the resource to the NRHP. Under the NHPA of 1966 as amended, only significant cultural resources warrant consideration with regard to adverse impacts from a federal agency's proposed action. To be considered significant, archaeological or architectural resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion in the NRHP. Resources generally must be more than 50 years old to be considered for protection under the NHPA. However, more recent structures associated with significant national events may warrant protection if they are "exceptionally significant."

In order to be considered a historic and cultural resource as defined by NHPA, a property must demonstrate significance within its historic context. Significance is evaluated by applying the following four criteria, which define the kind of significance that a property can represent. A property need only meet one criterion to be considered a historic and cultural resource under NHPA. The criteria are:

- Association with events that have made a substantial contribution to the broad patterns of our history;
- Association with the lives of persons substantial in our past;
- Embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a substantial or distinguishable entity whose components may lack individual distinction; or
- Have yielded, or may be likely to yield, information important in prehistory or history.

An assessment of integrity must be completed on any resource to determine if it retains the ability to represent its significance as a historic and cultural resource under NHPA. A property that retains integrity will embody several, and usually most, of the seven aspects of integrity (National Park Service 1997):

1. *Location* is the place where the historic property was constructed or the place where the historic event occurred.
2. *Design* is the combination of elements that create the form, plan, space, structure, and style of a property.
3. *Setting* is the physical environment of a historic property.
4. *Materials* are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
5. *Workmanship* is the physical evidence of the crafts of a particular culture or people during a given period in history or prehistory.
6. *Feeling* is a property's expression of aesthetic or historic sense of a particular period of time.
7. *Association* is the direct link between an important historic event or person and a historic property.

3.7.3 Regulatory Framework

Regulatory requirements concerning cultural resources on federal property are contained, principally, in NEPA (42 USC §§ 4321 et *seq*.) and in Sections 106 and 110 of the NHPA (54 USC §§ 300101 *et seq*.). Section 106 is implemented through 36 CFR Part 800, which defines a historic property as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior. Section 101(a)(I)(A) of the NHPA establishes the NRHP, which is implemented through regulation 36 CFR Part 60.

Table 3.7-1 presents those laws, regulations, and EOs that protect and preserve historic resources under the jurisdiction of federal agencies.

Table 3.7-1. Laws, Regulations, and Executive Orders

Law/Regulation	*Title*
16 USC §§ 461-467	Historic Sites Act of 1935, and Implementing Regulations
36 CFR § 65	National Historic Landmarks Program
Public Law 89-665	NHPA of 1966
36 CFR § 60	National Register of Historic Places
36 CFR § 67	The Secretary of the Interior's Standards for Rehabilitation
36 CFR § 68	The Secretary of the Interior's Standards for Preservation Projects
36 CFR § 79	Curation of Federally Owned Archaeological Resources
36 CFR § 800	Protection of Historic and Cultural Properties
Public Law 91-190	NEPA of 1969
Public Law 111-212 Section 405(a)	Supplemental Disaster Relief and Summer Jobs Act
Public Law 96-95	Archaeological Resources Protection Act of 1979
32 CFR § 229	Protection of Archaeological Resources
43 CFR §7 Subparts A and B	Protection of Archaeological Resources, Uniform Regulations and Department of the Interior Supplemental Regulations
Public Law 101-601	Native American Graves Protection and Repatriation Act of 1990
43 CFR §10	Native American Graves Protection and Repatriation Regulations
16 USC § 469c-2	Archaeological and Historic Preservation Act of 1974
42 USC § 1996-1996a	American Indian Religious Freedom Act of 1978
EO 11593 (1971)	Protection and Enhancement of the Cultural Environment
EO 13007 (1996)	Indian Sacred Sites – May 24, 1996
EO 13175 (1998)	Consultation and Coordination with Indian Tribal Governments

3.7.4 Existing Conditions

Proposed dam safety modifications are expected to be limited to the construction footprint of the 1950s dam, a few holding ponds of the LAERF, and any associated borrow sites to collect earthen materials used for modification.

3.7.4.1 Architectural/Engineering Resources

The Area of Potential Effect (APE) on architectural resources was determined by the USACE and was concurred by the THC on July 7, 2016. The primary architectural cultural resource within the APE is the Lewisville Dam itself, which was completed in 1955 and includes multiple components. The other resources within the APE are the USACE LAERF, located directly adjacent to the dam, and Ritter Cemetery, located adjacent to LAERF. A discussion of these resources, their historic significance, and potential impacts of the proposed undertaking are presented below.

Lewisville Dam

The Lewisville Dam was completed in 1955, resulting in the creation of Lewisville Lake. At over 50 years of age, the Lewisville Dam was evaluated as to whether it met the criteria for eligibility for listing in the NRHP. It was evaluated under Criterion A (association with important historic events) and C (embodiment of the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a substantial or distinguishable entity whose components may lack individual distinction).

A small portion of the current Lewisville Lake, then referred to as Lake Dallas, once was the primary water supply for the City when constructed in 1928. Today, many area lakes (Grapevine, Lavon, Ray Roberts, and Ray Hubbard) fulfill that role and in addition, provide a measure of flood control storage along with recreation.

In terms of its association with the development of Dallas, the original Lake Dallas was significant as the primary source of water supply but the 1950s saw the enlargement and construction of many area lakes to accommodate Post World War II expansion of the city. The greatly enlarged Lewisville Lake became one of many area lakes, which dilutes its comparative associative significance in terms of its direct effect on urban development. In comparison with the Dallas Floodway in terms of urban impact on the development and growth of Dallas, Lewisville Lake is not significant within the context of impacts to urban development of Dallas in the mid-twentieth century.

The USACE has determined the Lewisville Dam Little Elm-Garza earthworks do not meet the criteria for eligibility under Criterion A for the NRHP. The determination is pending coordination with the THC. The earthen remnants of the 1920s Lake Dallas dam are not evaluated because it is outside the APE of the proposed undertaking.

In terms of engineering design, Lewisville Dam is a simple 1950s era earthen dam much like the other area dams within the Trinity River Watershed such as Benbrook, Grapevine, and Ray Roberts. It has neither innovative features nor a distinctive engineering design. While it is an example of this period of 1950s lake construction, it is not a distinctive example, nor does it represent a variation, evolution, or transition of construction types. Major changes to the earthen embankment in the 1970s and 1980s also degraded its integrity of design even if it was significant within this context. The Lewisville Dam (Little Elm-Garza dam) does not meet the criteria for eligibility under Criterion C for the NRHP. This determination received concurrence from the THC on July 7, 2016.

USACE Lewisville Aquatic Ecosystem Research Facility

The LAERF is located immediately adjacent to the dam on USACE property. The LAERF is a USACE experimental facility that has supported research on biology, ecology, and management of aquatic plants since 1990. It operates on the former site of the Lewisville State Fish Hatchery, which operated from 1952 to 1983. The fish hatchery was specifically constructed to replace the hatchery associated with the Garza Little Elm Reservoir and Dam that was inundated after the construction of the new Lewisville Dam.

The significance of LAERF is integrally tied to the Lewisville Dam because its predecessor, the Lewisville Fish Hatchery, was initially constructed to mitigate the effects of impounding the Little Elm-Garza stream. Change in use from a fish hatchery to an aquatic research facility resulted in loss of integrity of feeling and association. Integrity of association is key to understanding the significance of the facility. The USACE has determined LAERF is not eligible for the NRHP. This determination received concurrence from the THC on July 7, 2016.

Ritter Cemetery

The historic-age Ritter Cemetery is located immediately south of the LAERF below the dam on land first purchased by William M. Ritter in 1855 and now owned by the USACE. Mr. Ritter's land included a small lake (Ritter's Lake), located near what would become the dam's outlet works, and grew into a small unincorporated community. Ritter allowed friends and neighbors to be buried on the grounds over the course of the last four decades of the 19th century. The earliest marked burial is his daughter six-year-old Elizabeth J. Ritter who died March 26, 1860. Some graves are marked only by large sandstones, leading to speculation that burials may have occurred earlier. Burials continued after Mr. Ritter's death in 1903 and his heirs officially deeded the cemetery to the Trustees of the Ritter Cemetery in 1917. The organization was formally incorporated in 1977 as the Ritter Cemetery Association which maintains the grounds of this still-active cemetery.

When construction of the Lewisville dam began in the 1950s, a Ritter Lake School, family farms and houses, and Ritter's Lake itself, ceased to exist. Land not inundated by the lake became part of present-day USACE property.

Designated a Historic Texas Cemetery in 2001 by the Texas Historic Commission, this cemetery is still active and is eligible for the NRHP for its associative values under Criterion A.

Ritter Cemetery is not directly affected by the undertaking. Indirectly, the undertaking has the potential to visually effect the resource. The cemetery is in a highly vegetated area that blocks views in all directions to a point where none of the risk reduction measures of the Proposed Action can be seen from the Cemetery. The USACE has determined the undertaking will have no adverse effect on Ritter Cemetery. This determination received concurrence from the THC on July 7, 2016.

3.7.4.2 Archeological Resources

The Lewisville Lake area encompasses the confluence of several major tributaries, including Hickory Creek and Little Elm Creek and straddles the ecotone of the Cross Timbers with the Blackland Prairie. Due to its geographical and ecological nexus, this area is important in respect to potential prehistoric and historic archeological resources. Its proximity to Dallas and the diversity of landform soil associations are significant in respect to occupations from the historic period.

The first archeological investigations were in the 1930s and 1940s. One of the most important and controversial sites, 41DN72, was found adjacent to the far western end of the dam on the lake side where a Clovis point was discovered prior to the dam construction. Extreme radiocarbon dates (37,000 years) associated with the site led some to suspect the Clovis point was planted. The site became inundated before the controversy was resolved, but in 1980, the Smithsonian Institution performed another analysis that dated it to 12,000 years ago. It is still considered one of the earliest known inhabited sites in the southwestern U.S.

A 514-acre survey was conducted immediately west of the spillway at the far eastern end of the dam in 2009. It resulted in the documentation of seven previously unrecorded sites and the revisitation of one previously recorded site. Four previously recorded sites could not be located. No standing structures or architectural resources were defined within the survey area.

Only one site, 4DN568, was found to be potentially eligible for listing in the NRHP as a historic site. The remaining six sites recorded did not identify potentially significant cultural deposits eligible for the NRHP.

An archaeological survey of the staging areas and borrow pits was conducted in 2016 (Peter et al.). Pedestrian survey, trenching, and judgmental shovels tests of the staging areas revealed no archaeological properties within the upper meter of sediments. Borrow Sites A and B were both surveyed and trenched for archaeological deposits. Neither activity revealed archaeological properties.

3.8 UTILITIES

3.8.1 Definition of Resource

This section focuses on the following utilities within the Project Area: gas and petroleum, communications, electricity, and potable water.

3.8.2 Methodology

The following analysis of utilities describes regional utility conditions within the Project Area and identifies dam utility encroachments. Potential impacts and mitigation measures related to implementation of the Proposed Action are assessed based on their affects in relation to the existing utility system. The ROI for utilities is the Project Area boundary (refer to Figure 2-1).

3.8.3 Regulatory Framework

The Underground Facility Damage Prevention and Safety Act (1999) and the Underground Pipeline Damage Prevention Program regulate the notification, reporting, and management of excavation activities within Texas.

3.8.4 Existing Conditions

In 1953, the City of Dallas entered into a cost-sharing and water supply agreement with the USACE for the reservoir to be created by the planned Garza-Little Elm Dam (which has since been expanded into Lewisville Lake impounded by the Lewisville Dam). As part of that agreement, the City of Dallas purchases 415,000 acre-feet of water per year, or 94.2% of the storage space between 481 and 515 feet above msl pool elevation. The 1953 agreement also included operations and maintenance cost-sharing, in which the City of Dallas is responsible for 21.9% of such costs. The agreement was updated in 1980, after the expansion of Lewisville Lake, to include 74% of the water storage from pool elevation 515 to 522 feet above msl. Per the 1980 agreement, the City of Dallas is likewise responsible to cost-share in 74% of the costs required to maintain the functioning and operations at Lewisville Lake between 515 and 522 feet above msl.

The City of Denton has similar agreements with the USACE from both 1953 and 1980. Per the 1953 agreement, the City of Denton acquired 4.8% of the storage space between 481 and 515 feet above msl, and would be responsible for 1% of operations and maintenance costs. Per the 1980 agreement, the City of Denton acquired 26% water storage from pool elevation 515 to 522 feet above msl, and is responsible for 26% of the costs required to maintain the functioning and operations at Lewisville Lake between 515 and 522 feet above msl.

Two water well locations are situated near the toe based on map locations 1 and 4 depicted in the May 2011 EDR well search report (Figure 3.8-1). Location 1 is identified as the raw municipal water intakes located just upstream of the dam structure in the lake, based on data reported by the TCEQ in 2003. Location 4 is identified as a 420-foot deep well, based on data reported by the Texas Water Development Board in 2005.

Location 4 from the May 2011 EDR well search report is the same well that was identified as Location 1 in the March 2014 EDR well search report, and is reported to be east of Fish Hatchery Road at latitude (north) 33.05833 degrees and longitude (west) 96.93417 degrees. Well Location 4 is outside the proposed dam, spillway, and borrow pit construction areas and unlikely to be affected.

The major utilities within the Project Area include:

- The City of Lewisville water intake facility and associated supply lines that penetrate the embankment. Underground water supply lines that include a 30-inch diameter line and a 36-inch diameter line that run adjacent to the toe of the dam and are offset as little as 15 feet from each other in some locations.
- North Texas Municipal Water District owns and operates a water intake facility with supply lines that also penetrate the embankment. Underground water supply lines run away from the dam for treatment.
- CoServe Electric, Texas New Mexico Power, and Garland Power & Light own and operate multiple utilities overhead of the Project Area.

A more comprehensive list of utilities within the vicinity of the Project Area is listed in Table 3.8-1. Figure 3.8-2 shows the existing utility lines that are within or adjacent to the Project Area.

Table 3.8-1. Utilities within Vicinity of Project Area

Utility Management Agency/Company	*Description of Utility*
CoServe Electric	Electrical transmission line along US 380 between 377 and Navo Road
City of Lewisville	24-inch diameter water line paralleling the existing 24-inch diameter water line from Fish Hatchery Road to the Eastside Pump Station
	12-inch diameter water line along east side of IH-35E from Lake Park Road north to Garden Ridge Boulevard
	36-inch diameter raw water line along Jones Street from east of Cowan Avenue to the City of Lewisville intake structures
	10 million gallons of additional water storage north of Feaster Pump Station
	20-inch diameter water line along Jones Street east of Feaster Pump Station
	Water treatment plant and ground storage on Kealy Street at Jones Street
	Sewage Treatment Plant on Sewage Treatment Plant Road and three sewer lines just outside the project area (south). Lines are 36-inch, 27-inch, and 42-inch diameter sewer lines
City of The Colony	12-inch diameter sanitary sewer main along west side of East Hill Park Road to serve East Hill Park and Pier 121 Marina
Upper Trinity Regional Water District	30-inch diameter water line in Hickory Creek area parallel to existing pipeline
	24-inch diameter potable or non-potable water pipeline in an existing 45 foot permanent utility easement parallel to Kansas City Southern Railroad south of the dam
	60-inch diameter raw water pipeline within an existing 45-foot permanent easement from the intake structure immediately north of the dam to the water treatment plant

Sources: USACE 1999; City of Lewisville 2016; City of The Colony 2016.

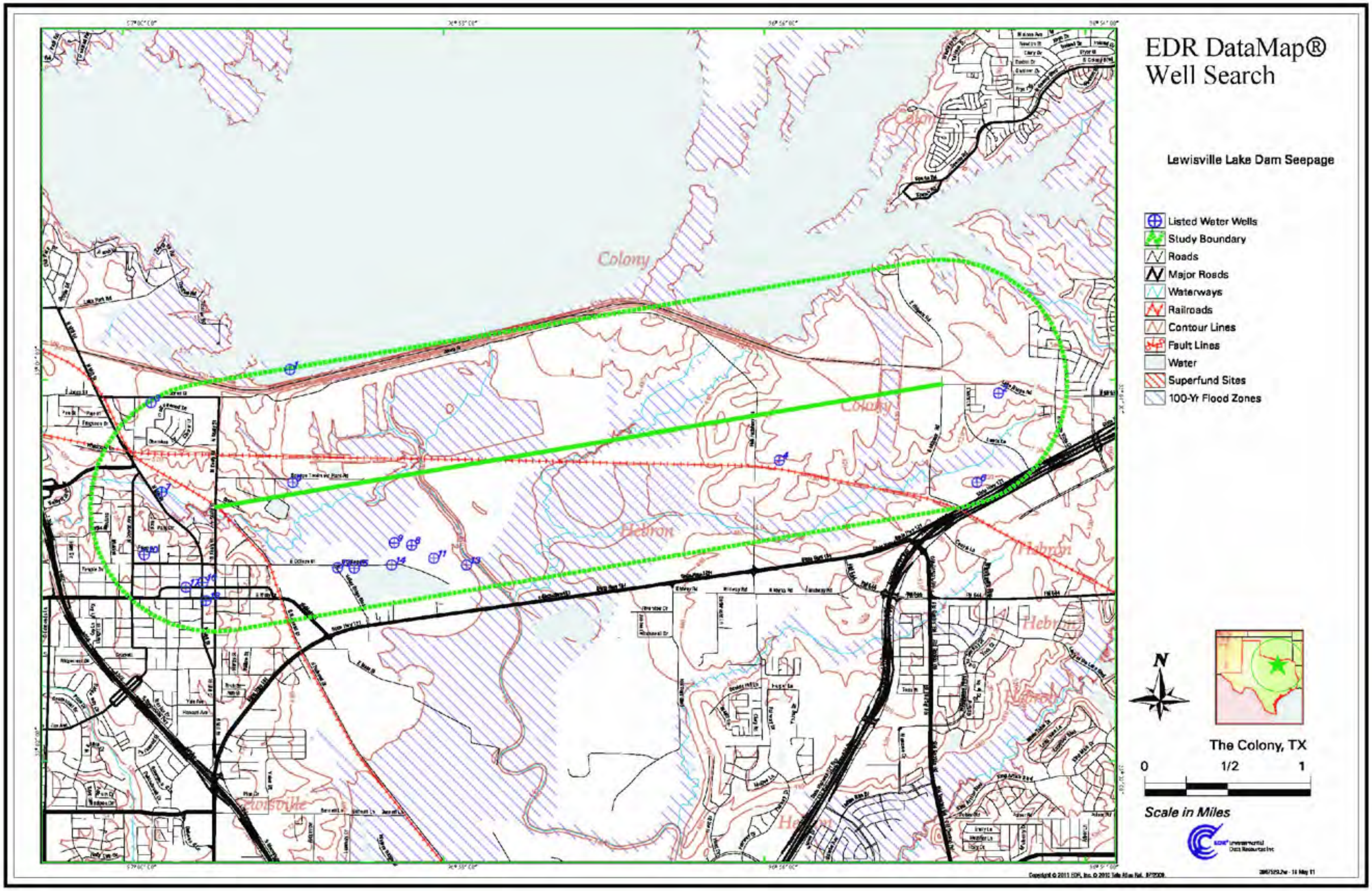
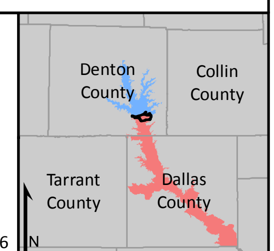


Figure 3.8-1. EDR Corridor Map with Well Locations

Project Area

Study Area



Sources: USACE 2015; Esri 2015; EDR 2016

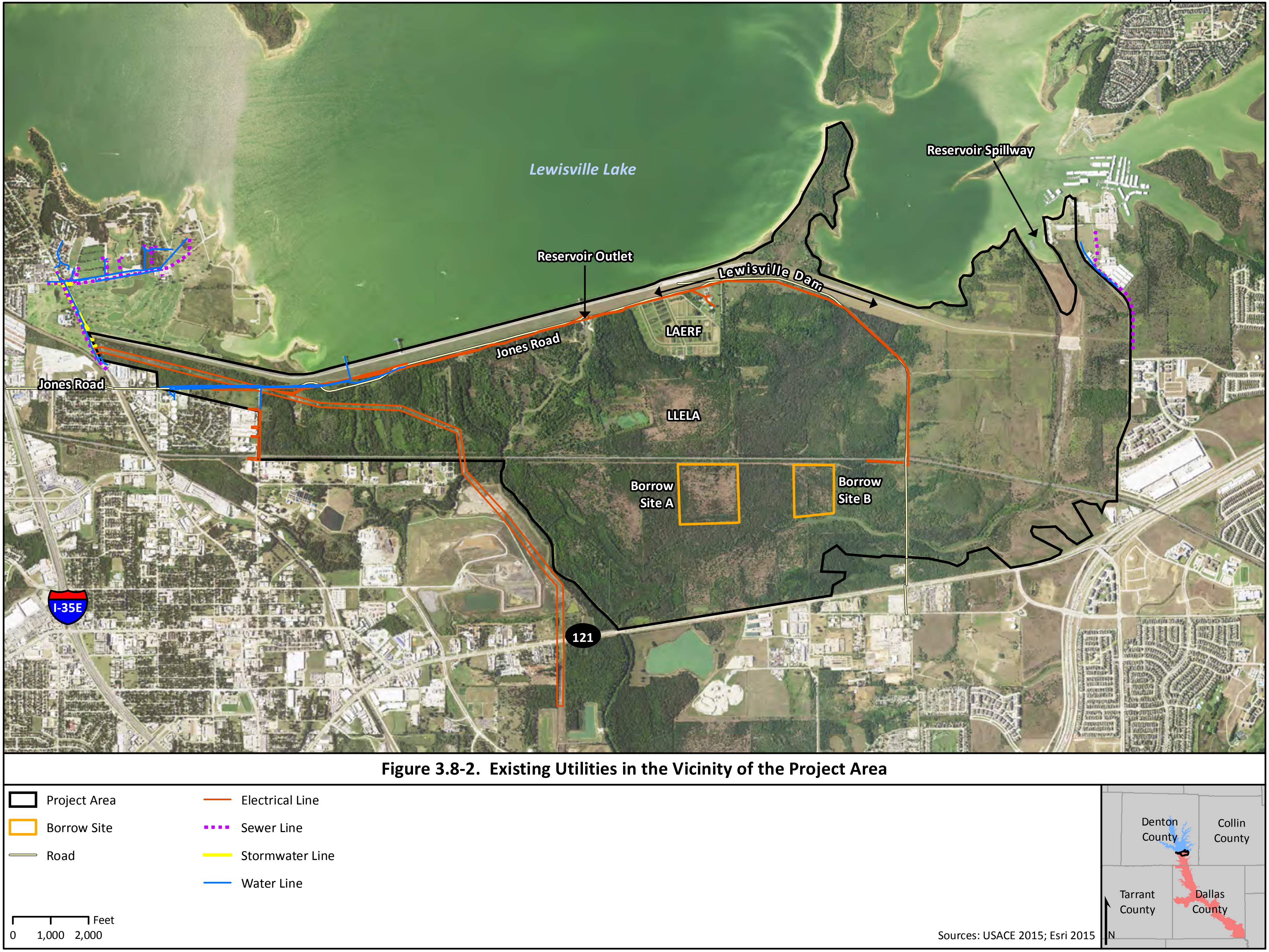


Figure 3.8-2. Existing Utilities in the Vicinity of the Project Area

3.9 RECREATION

3.9.1 Definition of Resource

Recreational facilities are defined as those amenities that provide relaxation, rest, activity, education, or other opportunities for leisure services and community support that lead to an enhanced quality of life. These include, but are not limited to parks, lakes, trails, athletic fields, playgrounds, and community centers. Recreational areas may include any type of activity in which area residents, visitors, and tourists may participate. Activities include hiking, boating, picnicking, playground use, boating, swimming, fishing, and organized or informal sports.

3.9.2 Methodology

Public use of recreational amenities is correlated tightly with proximity as well as multiple-activity opportunities (i.e., land and water recreation) and is typically the primary driver in an individual's decision-making regarding recreational activities (Tarrant et al. 1999). The ROI for recreational resources is the Project Area and entire Lewisville Lake for water-related recreational resources.

3.9.3 Regulatory Framework

The following local plans related to recreation apply to the Project Area:

- Lewisville Lake Master Plan
- A Trail Master Plan for the City of The Colony
- The 2011 Lewisville Trails Master Plan

3.9.4 Existing Conditions

The reservoir created by the Lewisville Dam provides 29,600 surface acres of water and 233 miles of shoreline under normal operating pool conditions (USACE 1997). The reservoir is referred to as Lewisville Lake and is one of several USACE lakes that facilitate recreational opportunities for Denton and the surrounding counties. Lewisville Lake is popular for multiple activities such as fishing, water sports (e.g., swimming, jet skiing, and water skiing), boating, and outdoor recreation that includes picnic areas, RV and tent camping sites, beaches, athletic fields, and miles of scenic hiking and biking trails (City of Lewisville 2016; LLELA 2016). The Project Area abuts the southern portion of Lewisville Lake.

There are currently 34 developed parks and/or lake access areas around Lewisville Lake that provide areas for water-related recreation. The parks and lake access areas include a variety of recreation facilities for public use. The majority of the parks listed in ROI are located at the lake's edge and are in part or completely within fee ownership or flowage easement maintained by the USACE. Five marinas are also located around the lake that provide services to boaters and anglers. Figure 3.9-1 shows where these facilities are located within the Project Area, as well as terrestrial recreational resource areas located within or adjacent to the Project Area. The following sections describe the terrestrial and aquatic recreational resource activities that occur within and adjacent to the Project Area.

Various upland recreational activities that occur within the Project Area or adjacent to it include picnicking, RV and tent camping, hunting, and trail use (biking and hiking). There is both a 9-hole and 18-hole golf course located on Lake Park and a golf club located across from the Project Area in the City of The Colony.

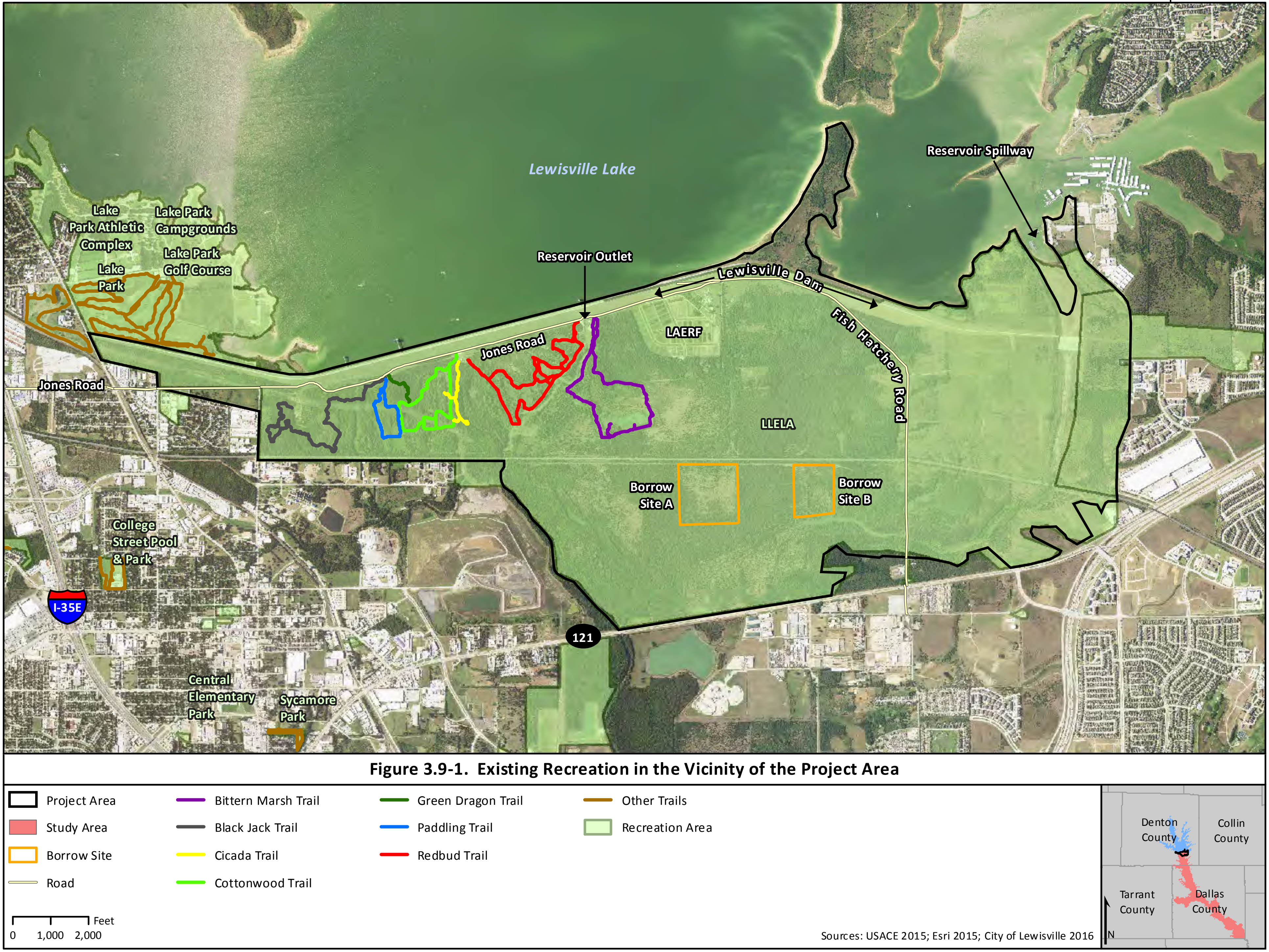


Figure 3.9-1. Existing Recreation in the Vicinity of the Project Area

The USACE operates four pavilions on Lewisville Lake that include Cottonwood Pavilion, Green Ash Pavilion, Bur Oak Pavilion, and Blackjack Oak Pavilion. These are often used for community events and picnicking (USACE 2015). The main campgrounds visited at Lewisville Lake are the following: Hickory Creek Park, Lake Park, Pilot Knoll, Stewart Creek Park, Sycamore Bend Park, and Willow Grove Park campgrounds. All of these campgrounds have boat ramp access for those boating enthusiasts that enjoy water-related recreational activities.

The USACE has dedicated 8,000 acres of hunting area on government lands around the lake, which are managed as natural areas. Hunting areas open from September through August of the following year. Legal hunting game is restricted to the following: Dove, quail, squirrel, rabbits, snipe, rails, feral hogs, waterfowl, and turkey (USACE 2015).

There are multiple trails around Lewisville Lake but the main trails within the Project Area are The Colony Shoreline Trail and LLELA-managed trails. The Colony Shoreline Trail is four miles in length and composed of concrete and crushed stone. It navigates through more than 250 acres of wildlife habitat and passing scenic shores of Lewisville Lake. The trail winds through City parkland as well as USACE wildlife management area before connecting a neighborhood park (Ridgepointe Park) on the southern end to a City-leased USACE park (Stewart Creek Park) at the northwestern end. Pedestrians and cyclists frequently use this trail (TrailLink.com 2016). The LLELA-managed trails are used for hiking and include Cottonwood Trail, Bittern Marsh Trail, Cicada Trail, and Redbud Trail (LLELA 2016).

Lewisville Lake Environmental Learning Area

Also known as the Lewisville Wildlife Management Area, LLELA is composed of over 2,000 acres of USACE land located below the Lewisville Dam. It is currently managed by a consortium comprised of the University of North Texas, Texas A&M University, the City of Lewisville, and the Lewisville Independent School District. LLELA provides environmental education, environmental research, and the preservation and restoration of native habitat and biodiversity. See Section 3.4 for a description of the natural resources that occur on LLELA. Recreational and educational opportunities provided by LLELA include guided trail tours; guided bird, butterfly, and wildflower walks; nature talks, kids' activity areas, and LLELA nursery tours. Trails include hiking trails (as noted previously) and a Kayak Paddling Trail. There are also campgrounds and picnicking areas. The facility is open 7 days per week, and also provides field study participation to school children, Scouts, and college students as well as spring break camps and summer camps (LLELA 2016). Between September 30, 2013 and September 2014 over 12,300 children, Scouts, and college students participated in activities offered by LLELA.

<u>Aquatic Recreational Resource Activities</u>

Boating and swimming are likely the most popular recreational activities on Lewisville Lake. The recreational boating season is approximately 14 weeks starting Memorial Day weekend (May) through Labor Day weekend (September). There are currently four boat clubs that utilize the lake regularly. These include Dallas Yacht Club, Dallas Corinthian Yacht Club, Pier 121 Yacht Club, and The Lake Lewisville Sailing Club. The Lake Lewisville Sailing Club is located at Pier 121 Marina and it organizes keelboat races throughout the year as well as weekly Wednesday night races, beginning in the springtime. Other race events include themed events, long distance, and relay races. The sailing club also organizes seminars and sailing classes (combinations of classroom and on-the-water instruction) (Lake Lewisville Sailing Club 2015). The largest races are Annual Cup races that are hosted by any of the above named yacht/boating clubs. This race is a large event with more than 14 boats competing.

The main swimming beaches on Lewisville Lake are Little Elm Park, Stewart Creek Park, Hidden Cove Park, East Hill Park, Copperas Branch Park, and Lake Park beaches. Not all of these have designated roped off swimming areas but are frequented by swimmers nonetheless.

Fishing is also very popular on Lewisville Lake. The most angling activity on Lewisville Lake is fishing for white crappie and white bass. Other fish that provide popular angling opportunities include largemouth bass, hybrid striped bass, and blue and channel catfish (TPWD 2016). The Lake also hosts 24-hour fishing barges.

With the increasing public demand for various water-related recreational activities, Lewisville Lake has provided and continues to provide a variety of natural and man-made resources, which fulfill the leisure needs of approximately 3 million visitors each year.

3.10 TRANSPORTATION

3.10.1 Definition of Resource

For the purpose of this EA, transportation refers to the movement of people, goods, and/or equipment on a surface transportation network. A surface transportation network may include many different types of facilities that serve a variety of transportation modes, such as vehicular traffic, public transit, and non-motorized travel (e.g., pedestrians and bicycles). The relative importance of various transportation modes is influenced by development patterns and the characteristics of transportation facilities. In general, compact areas that contain a mixture of land uses tend to encourage greater use of public transit and/or non-motorized modes, especially if pedestrian, bicycle, and transit facilities provide desired connections and are well operated and well maintained. More dispersed and segregated land uses tend to encourage greater use of passenger cars and other vehicles, particularly if extensive parking is provided.

3.10.2 Methodology

Existing planning documents were reviewed to assess potential impacts resulting from the Proposed Action related to transportation. Documents reviewed include *Mobility 2040*, *2015-2018 Transportation Improvement Program (TIP) for North Central Texas*, and the City of Lewisville's *2007 Thoroughfare Plan*. Potential impacts were assessed qualitatively by considering the concentration of project-related construction trips during peak hour commutes, and the potential for contributing toward traffic congestion in and surrounding the ROI.

3.10.3 Regulatory Framework

<u>State</u>

The *Texas Transportation Plan 2040*, adopted on February 26, 2015 by the Texas Transportation Commission, is the long-range plan for multimodal transportation in the state. The plan serves as a blueprint for the transportation planning process that guides the collaborative efforts between TxDOT, local and regional decision-makers, and allow transportation stakeholders to reach a consensus on needed transportation projects and services. The plan covers a 25-year period (2015 to 2040), provides an inventory, and addresses the need for improvements to the state's transportation system, including roadways, pedestrian and bicycle facilities, transit, freight and passenger rail, airports, waterways and ports, pipelines, and intelligent transportation systems.

Another guiding document, the *Texas Department of Transportation Strategic Plan, 2015-2019*, was adopted by the Texas Transportation Commission on June 26, 2014. This document outlines TxDOT's philosophy on its mission, values, goals, objectives, budgetary performance measures, strategies, and key planning and contextual information that guides this agency during the 5-year planning horizon. *The Texas Department of Transportation Strategic Plan, 2015-2019* articulates the following goals:

- Maintain a safe transportation system;
- Address congestion;
- Connect Texas communities; and
- Become a "best in class" state agency.

TxDOT's priorities include being the safest state department of transportation in the U.S., implementing congestion mitigation projects, strengthening its relationship with Metropolitan Planning Organizations, counties, key stakeholders, and others.

<u>Regional</u>

Mobility 2040: The Metropolitan Transportation Plan for North Central Texas, adopted in March 2016, is a comprehensive, multimodal blueprint for transportation systems and services aimed at meeting the mobility needs of the Dallas-Fort Worth Metropolitan Area. This long-range plan is based on projected conditions in the year 2040 (NCTCOG 2016), and incorporates future transportation improvements planned to be in place by 2040. This document was prepared by NCTCOG and the Regional Transportation Council in their capacity as the Metropolitan Planning Organizations, and in accordance with the metropolitan planning regulations provided in *Intermodal Surface Transportation Efficiency Act* and *Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*.

The *2015-2018 Transportation Improvement Program (TIP) for North Central Texas* is a staged, multi-year program of projects proposed for funding by federal, state, and local sources within the Dallas-Fort Worth Metropolitan Area. The *2015-2018 TIP* identifies roadway and transit projects programmed for construction within the next four years in the Dallas-Fort Worth Metropolitan Area. The *2015-2018 TIP* was developed by NCTCOG in cooperation with local governments, TxDOT, and local transportation agencies. The *2015-2018 TIP* was developed in accordance with the metropolitan planning requirements set forth in the Statewide and Metropolitan Planning Final Rule (23 CFR Part 450, 49 CFR Part 613) promulgated in the October 1, 2009 Federal Register as required by *SAFETEA-LU*. The *2015-2018 TIP* was prepared under guidelines set forth in the CFRs (referenced above) as updated on June 9, 2006, as included in *SAFETEA-LU*.

3.10.4 Existing Conditions

The ROI for transportation consists of the area surrounding the southern edge of Lewisville Lake. Directly south of the Lewisville Lake is primarily open space, where LAERF and LLELA are located. The LLELA hosts numerous educational visits for local students each year, who travel to the site by bus. These trips generally do not take place during the peak-hour traffic. On the southwest side of the lake there are two marinas, a park, a golf course, and light industrial, mixed use and residential development, with the residential development being concentrated west of IH-35E. On the southeast side of the lake, there is a marina, park, and residential and commercial development. SH 121/Sam Rayburn Tollway and Farm to Market Road 423, which is known locally as Main Street, cross this area. A description of the existing vehicular traffic and non-motorized transportation is provided in the following sections.

3.10.4.1 Freeways

Freeways are limited access facilities designed to accommodate the regional movement of people and goods. The primary freeway running through the ROI is IH-35E, which is also known as the Stemmons Freeway. IH-35E is a major north-south freeway through the City of Lewisville. Other major roads in the ROI include:

- Sam Rayburn Tollway (formerly known as SH 121): a toll road maintained by the North Texas Tollway Authority that runs northeasterly from Business 121 road near the Denton/Dallas County line, and intersects IH-35E in the southeastern portion of Lewisville.
- Farm to Market 423, which is also called Main Street, runs north-south and provides access to the east side of Lewisville Lake.

3.10.4.2 Bridges

IH-35E crosses the eastern leg of Lewisville Lake, and becomes a four-lane divided bridge over the water. This bridge is sometimes referred to as the Lewisville Lake Bridge. The following is a major bridge that crosses Lewisville Lake, north of the ROI:

- Lewisville Lake Toll Bridge: a four-lane divided bridge operated by the North Texas Tollway Authority. Swisher Road, a four-lane undivided road, connects to the toll bridge from the west. When the bridge meets land on the east side of the lake, it becomes West Eldorado Parkway, a four-lane undivided street.

3.10.4.3 City of Lewisville Street Classifications

The City of Lewisville’s 2007 Thoroughfare Plan classifies streets as Principal Arterial Six-Lane Divided, Principal Arterial Four-Lane Divided, Collector Four-Lane Undivided, Collector Two-Lane Undivided, and One Way Arterial. The following roads provide local access to Lewisville Lake:

- Principal Arterial Four-Lane Divided:
  - Business 121: runs north-south for a portion and then curves to an east-west orientation as it proceeds east.
  - Garden Ridge Boulevard: runs north-south and provides access for the residential neighborhoods west of IH-35E to the freeway.
  - Valley Ridge Boulevard: runs east-west and provides access for the residential neighborhoods west of IH-35E to the freeway.
- Collector Four-Lane Undivided:
  - Lake Park Road: runs east-west starting at the IH-35E and heads east towards Lewisville Lake.
  - Mill Street: runs north-south starting at the Business 121 and travelling north until it reaches Lewisville Lake.
  - Jones Street: runs east-west starting at the IH-35E and heads east below the edge of Lewisville Lake, terminating at LAERF.
  - Kealy Avenue: runs north-south and terminates at its intersection with Jones Street.

3.10.4.4 Commuter Rail and Movement of Freight

There is a commercial/freight Kansas City Southern Railroad track that runs west-east a few blocks below Jones Street. The railroad crosses IH-35E and Mill Street and continues east past the ROI. A second railroad track, Dallas, Garland & Northeastern Railroad (DGNO), runs parallel with IH-35E bridge across Lewisville Lake and then veers slightly southeast as it continues below the lake and into the City of Lewisville. The Denton County Transit Authority (DCTA) operates a commuter train, the A-train, along a portion of the DGNO track. The Highland Village/Lewisville Lake Station is located along the IH-35E, and there is a small, outdoor parking lot attached to the station (DCTA 2015).

3.10.4.5 Maintenance Access

There is a one-lane maintenance road that begins at Mill Street and runs around the southern edge of Lewisville Lake. Access to the maintenance road is prohibited to the public, and the entrance is gated.

3.10.4.6 Parking

Recreational visitors travel to various points along the lake's southern border via freeways and surface streets, as described above. There are two public access points within the ROI, labeled as B6: Tower Bay and B7: Lewisville City Park by the TPWD. Tower Bay is located off IH-35E, and has a four-lane concrete boat ramp and parking for 50 vehicles. Lewisville City Park is located on Lake Park Road (which is accessible from North Mill Street) and has 11 boat lanes and parking for 108 vehicles. Local schools transport students by bus to LLELA for field trips throughout the year and parking is available at the LLELA for groups and visitors.

3.11 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.11.1 Definition of Resource

Socioeconomics is defined as the basic attributes and resources associated with the human environment, particularly population, demographics, and economic development. Demographics entail population characteristics and include data pertaining to race, gender, income, housing, poverty status, and educational attainment. Economic development or activity typically includes employment, wages, business patterns, an area's industrial base, and its economic growth.

The USEPA describes environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (USEPA 2010). Fair treatment means that no group of people, including racial, ethnic, or socioeconomic, should bear a disproportionate share of the negative environmental consequences resulting from the execution of federal, state, local, and tribal programs and policies. The goal of fair treatment is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these effects. Federal agencies must provide minority and low-income communities with access to information on matters relating to human health or the environment and opportunities for input in the NEPA process, including input on potential effects and mitigation measures.

3.11.2 Methodology

In order to provide a basis upon which to evaluate how elements of the human environment might be affected by the proposed action, this section provides recently published socioeconomic data for the ROI. Data presented include information on population and demographics, employment, education, and housing. For environmental justice analysis, minority populations are identified where either: (a) the minority population of the affected area exceeds 50% or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis" (EO 12989). Minority populations include populations that report their ethnicity as something other than non-Hispanic White alone, including Native Hawaiian or other Pacific Islander, Asian, Black or African American, Hispanic or Latin, American Indian, or Alaska Native (U.S. Census Bureau 2011).

3.11.3 Regulatory Framework

The CEQ regulations implementing NEPA state that when economic or social effects and natural or physical environmental effects are interrelated, the NEPA document would discuss these effects on the human environment (40 CFR § 1508.14). The CEQ regulations further state that the "human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment." In addition, 40 CFR § 1508.8 states that agencies need to assess not only direct effects, but also "aesthetic, historic, cultural, economic, social, or health" effects. Following from these regulations, the socioeconomic analysis in this EA evaluates how elements of the human environment such as population, employment, housing, and public services might be affected by the proposed action.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, tasks "each federal agency [to] make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionally high adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations." EO12898, dated February 11, 1994, aims to: (1) focus the attention of federal agencies on the environmental and human health conditions in minority communities and low-income communities with the goal of achieving environmental justice; (2) foster non-discrimination in federal programs that substantially affect human health or the environment; and (3) give minority communities and low-income communities greater opportunities for public participation in, and access to public information on, matters relating to human health and the environment.

Because children may suffer disproportionately from environmental health risks and safety risks, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, was issued on April 21, 1997 to help ensure that federal agencies' policies, programs, activities, and standards address environmental health and safety risks to children. EO 13045 requires all federal agencies to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that may result from environmental health risks or safety risks.

3.11.4 Existing Conditions

The ROI for socioeconomics and environmental justice extends beyond the Study Area, and is defined by the census tracts that intersect the probably maximum flood downstream of Lewisville Dam to the southern end of Dallas County. The ROI includes 181 census tracts.

3.11.4.1 Population and Demographics

As shown in Table 3.11-1 and Figure 3.11-1, the total population for the ROI in 2012 was 758,956, representing approximately 3% of the population of the state of Texas. Denton County is the 9th largest county in Texas and 88th largest in the nation and Dallas County is the 2nd largest county in Texas and the 9th largest in the nation.

Table 3.11-1. Area Populations, 2012

Region	*Population*
ROI	758,956
Denton County	667,934
Dallas County	2,379,214
State of Texas	25,208,897

Source: U.S. Census Bureau 2012.

As shown in Table 3.11-2, the 2012 population in the ROI consisted of 39.8% Hispanic or Latino, 31.7% white, and 19.0% Black or African American. A small portion of the population consisted of Asian, Native Hawaiian and Other Pacific Islander, American Indian, and Alaska Native, Some other Race, and Two or More Races. Denton County had a larger percentage of white population and a lower percentage of Black or African American and Hispanic or Latino. Dallas County had the highest percentage of Black or African American.

Table 3.11-2. Race and Ethnicity, 2012

Race and Ethnicity	*ROI*	*Denton County*	*Dallas County*	*State of Texas*
White	31.7%	64.4%	33.2%	45.3%
Black or African American	19.0%	8.0%	21.7%	11.5%
American Indian and Alaska Native	0.2%	0.3%	0.2%	0.3%
Asian	7.8%	6.6%	5.1%	3.8%
Native Hawaiian and Other Pacific Islander	0.1%	0.1%	0.1%	0.1%
Hispanic or Latino	39.8%	18.2%	37.2%	37.6%
Some other Race	0.2%	0.2%	0.2%	0.2%
Two or More Races	1.7%	2.4%	1.5%	1.3%

Source: U.S. Census Bureau 2012.

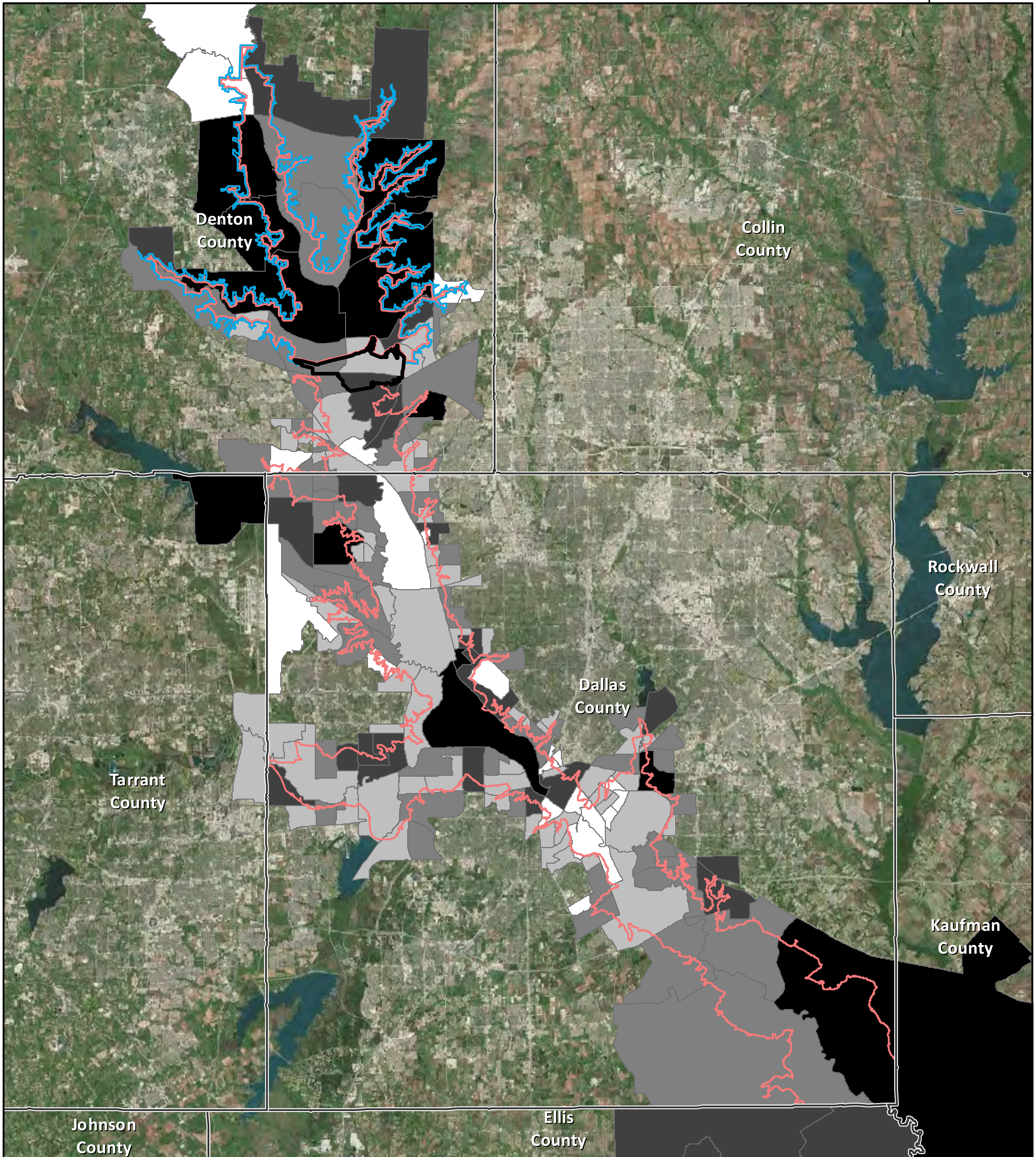
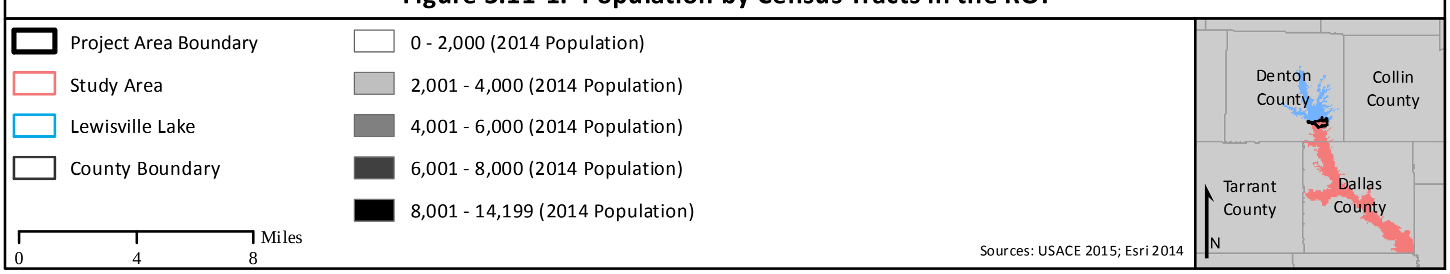


Figure 3.11-1. Population by Census Tracts in the ROI



3.11.4.2 Employment

Employment in the ROI in 2012 was 357,380. Employment in the ROI was concentrated in Education, Health Care (16.2%), Professional, Scientific, Management (14.4%), and Retail Trade (10.6%). Education, and Health Care are the top source of employment for the ROI, Denton County, Dallas County, and the state of Texas. Table 3.11-3 shows a breakdown of employment by industry.

Table 3.11-3. Employment by Industry, 2012

Industry	*ROI*	*Denton County*	*Dallas County*	*State of Texas*
Total Civilian Employed Population 16 years and Older	357,380	353,234	1,124,454	11,440,956
Agriculture, Extension	2,377	4,180	7,436	343,348
Construction	33,854	18,007	105,711	928,574
Manufacturing	36,665	33,527	107,718	1,086,151
Wholesale Trade	12,452	12,804	34,415	349,556
Retail Trade	38,038	43,573	123,830	1,331,684
Transportation, Warehousing, Utilities	21,507	18,948	64,575	636,941
Information	9,999	11,370	28,783	220,371
Finance, Insurance, Real Estate	32,536	36,090	103,957	767,868
Professional, Scientific, Management	51,614	46,669	152,806	1,227,671
Education, Health Care	57,842	71,680	200,754	2,461,200
Arts, Entertainment, Accommodation, Food Services	33,433	29,929	103,918	968,713
Other Services	18,390	16,325	60,396	608,319
Public Administration	8,673	10,132	30,155	510,560

Source: U.S. Census Bureau 2012.

3.11.4.3 Education

Table 3.11-4 shows the breakdown of school enrollment by level of education for the ROI, Denton County, Dallas County, and Texas for 2012. The ROI had a higher percentage of enrolled students in Preschool-Kindergarten, Grades 1-8, and High School than any other region. The ROI had a lower percentage of its enrolled students in college or graduate school.

Table 3.11-4. School Enrollment by Level of Education, 2012

Education Level	*ROI*	*Denton County*	*Dallas County*	*State of Texas*
Preschool-Kindergarten	12.9%	12.4%	12.0%	12.0%
Grades 1-8	44.6%	39.9%	44.5%	42.8%
High School	21.2%	17.5%	21.4%	21.0%
College and Graduate School	21.3%	30.2%	22.1%	24.2%

Source: U.S. Census Bureau 2012.

Table 3.11-5 shows the breakdown of educational attainment for the ROI, Denton County, Dallas County, and Texas. The ROI had the highest percentage of individuals that did not complete high school, however, the ROI had a greater percentage of individuals that had a Bachelor's or advanced degree compared to both Dallas County and the state of Texas. In general, Denton County had the highest level of educational attainment, having the lowest rate of those who did not complete high school and the highest rates of individuals who had at least some college or a college degree.

Table 3.11-5. Educational Attainment, 2012

Educational Attainment	*ROI*	*Denton County*	*Dallas County*	*State of Texas*
Did Not Complete High School	24.9%	8.5%	22.9%	19.2%
High School or Equivalent, no College	22.3%	18.8%	34.4%	25.2%
Some College or Associate's degree	23.7%	32.5%	25.9%	29.2%
Bachelor's degree or advanced degree	29.2%	40.1%	16.8%	26.3%

Note: [1] Educational attainment for those 25 years and older.
Source: U.S. Census Bureau 2012.

3.11.4.4 Housing

Table 3.11-6 shows the breakdown of Housing Occupancy in the ROI, Denton and Dallas Counties, and Texas as of 2012. In 2012, there were 295,919 housing units in the ROI, of which 89.7% were occupied and 10.3% were vacant. Texas had the lowest percentage of occupied housing units when compared to the ROI, Denton County, and Dallas County. Dallas County had a lower percentage of owner-occupied housing units and a higher percentage of renter-occupied housing units when compared to the ROI, Denton County, and the state of Texas.

Table 3.11-6. Housing Occupancy, 2012

Housing Occupancy	*ROI*	*Denton County*	*Dallas County*	*State of Texas*
Total Housing Units	295,919	255,790	253,387	9,978,137
Percent Occupied	89.7%	92.9%	89.2%	88.0%
Percent Vacant	10.3%	7.1%	10.8%	12.0%
Owner-Occupied	50.0%	65.9%	49.6%	63.9%
Renter-Occupied	50.0%	34.1%	50.4%	36.1%

Source: U.S. Census Bureau 2012.

3.11.4.5 Environmental Justice

Minority Population Areas

A census block group is considered an environmental justice minority population area if 50% or more of the residents are Black or African American, Asian, American Indian or Native Alaskan, Native Hawaiian or Other Pacific Islander, or Hispanic or Latino. There are several of these census block groups in the ROI (Figure 3.11-2).

Low-Income Population Areas

A census block group is considered an environmental justice low-income population area is 20% or more of the households within the block group have incomes below the poverty line, as identified in U.S. Census Bureau publications. There are several of these census block groups in the ROI (Figure 3.11-3).

Areas Used by Children

There are no schools, hospitals, or churches located within the Project Area; however there are many recreational areas (refer to Section 3.9).

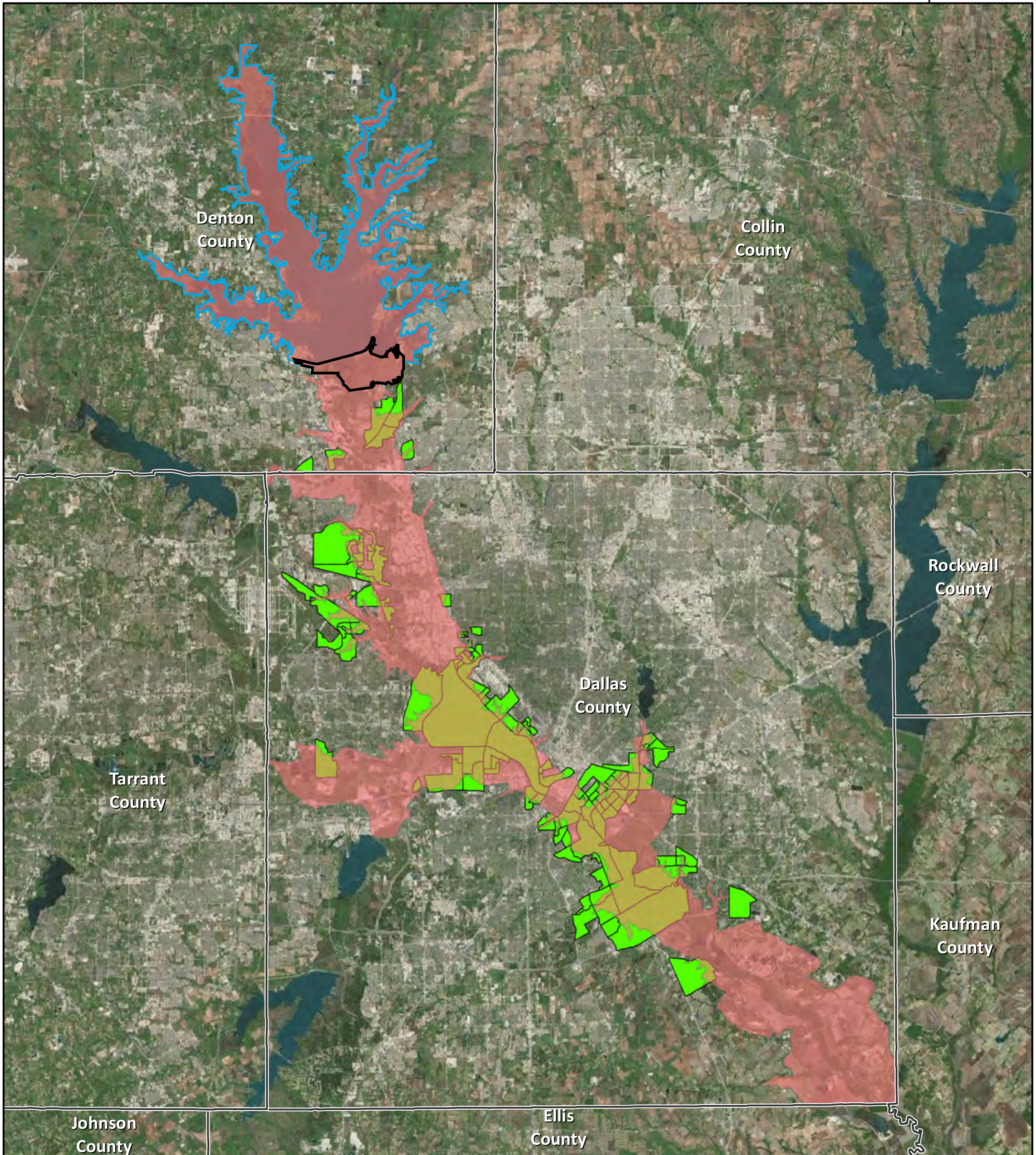
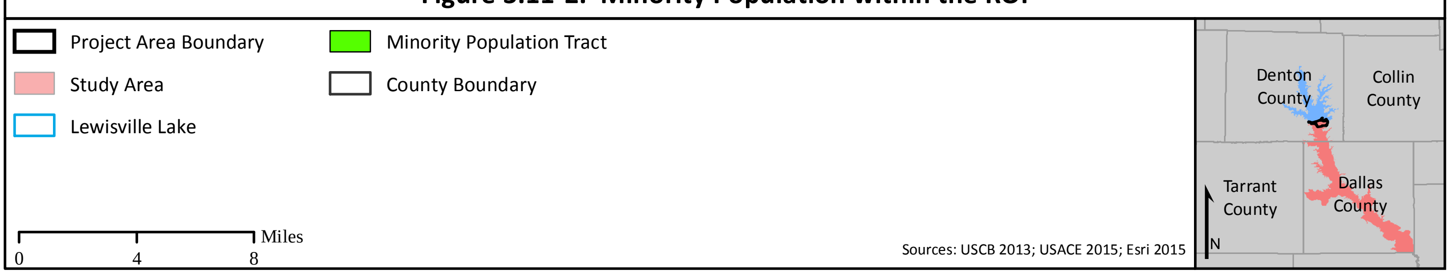


Figure 3.11-2. Minority Population within the ROI



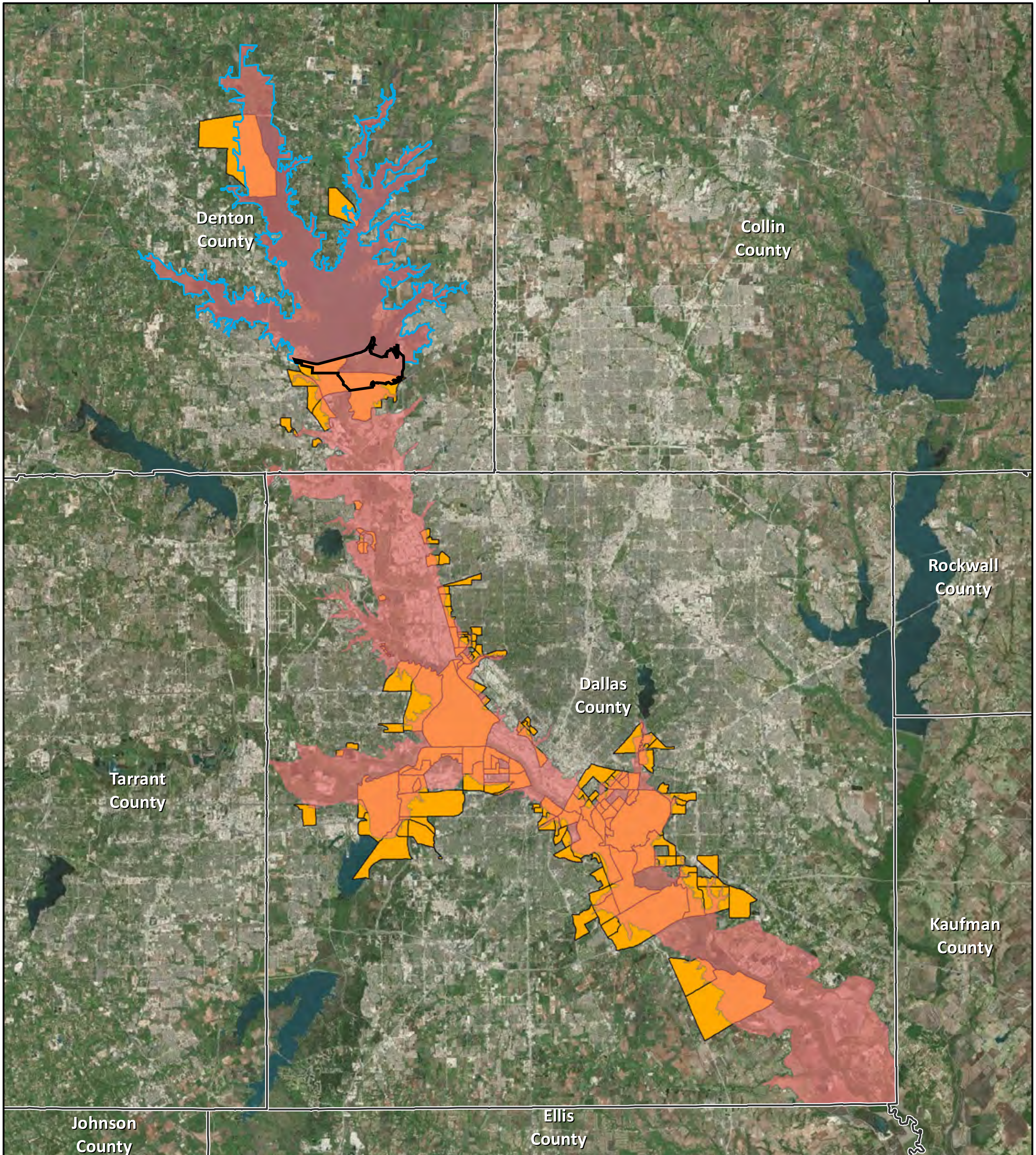
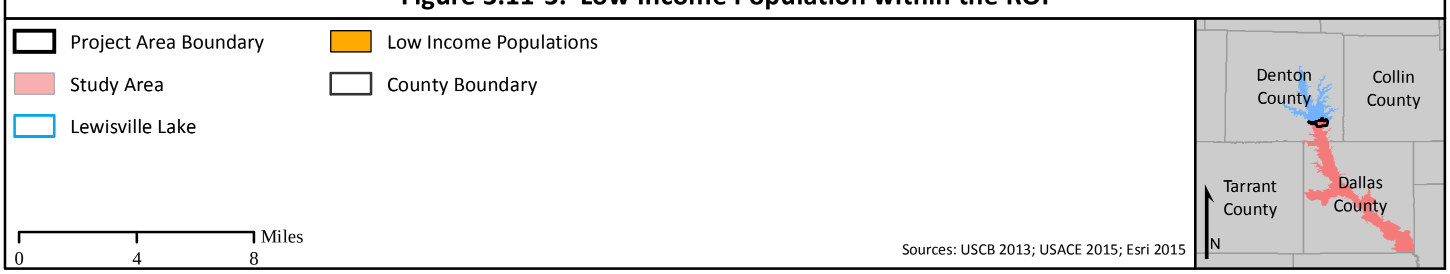


Figure 3.11-3. Low Income Population within the ROI



3.12 CLIMATE

3.12.1 Definition of Resource

Climate is defined as long-term averages and variations in weather measured over a period of several decades. The Earth's climate system includes the land surface, atmosphere, oceans, and ice. Climate incorporates temperature, precipitation, and similar conditions, as well as the frequency and likelihood of weather extremes (e.g., heat waves or heavy rain events).

3.12.2 Methodology

Climate conditions and analysis is derived primarily from the current conditions and projections included in the National Climate Assessment of 2014 (U.S. Global Change Research Program [USGCRP] 2014). The ROI for climate is Denton, Tarrant, and Dallas Counties.

3.12.3 Regulatory Framework

The *Revised Draft Guidance on the Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews* issued by the CEQ on December 18, 2014 recommends incorporating impacts associated with climate change as part of the standard cumulative impact analysis of all NEPA documents. The draft guidance encourages agencies to determine which climate change impacts warrant consideration in their analyses based on both the Proposed Action's potential impact to climate changes and the potential impact a changing climate may have on implementation of the Proposed Action.

3.12.4 Existing Conditions

The climate of Denton and Dallas Counties is humid subtropical with hot summers and mild winters. Snowfall and sub-freezing temperatures are experienced occasionally during the winter season. Generally, the winter temperatures are mild with occasional cold periods of short duration resulting from the rapid movement of cold pressure air masses from the Northwestern polar regions and the continental western highlands. The average annual temperature in Denton County is 65 degrees Fahrenheit (° F) with average low and high temperatures ranging from 33° F in January to 96° F in August. Recorded temperatures have ranged from a high of 113° F in 1936 to a low of -3° F in 1949. In Dallas County, the average annual temperature is 66° F with average low and high temperatures ranging from 45° F in January to 86° F in August. Recorded temperatures have ranged from a high of 113° F in 1980 to a low of -3° in 1930.

The relative humidity typically rages from 35% to 91% over the course of the year, rarely dropping below 20% and reaching as high as 100%. The air is driest around the end of July/early August timeframe and is most humid around early May, exceeding 87% three days out of four.

Annual precipitation in Denton and Dallas Counties averages 38.1 and 37.6 inches per year, respectively. A large part of the annual precipitation results from thunderstorm activity, with occasional very heavy rainfall over brief periods. Thunderstorms occur throughout the year, but are more frequent in the late spring and early summer. The major storms experienced in the Study Area are produced by heavy rainfall from frontal-type storms that generally occur in the spring and summer months, but major flooding can also be produced by intense rainfall associated with localized thunderstorms. Based on an average annual evaporation rate over the last several years from three USACE lakes (Benbrook, Joe Pool, and Grapevine) in the Dallas/Fort Worth Metroplex, within an approximate 50-mile radius from Lewisville Lake, evaporation in the Project Area is estimated to be approximately 60 inches per year. The average length of the warm season (freeze-free period) is about 249 days, extending from mid-March to mid-November.

The USGCRP looks at potential impacts of climate change globally, nationally, regionally, and by resource (e.g., water resources, ecosystems, human health). The city of Dallas is within the Great Plains region of analysis. The Great Plains region has already seen evidence of climate change in the form of rising temperatures that are leading to increased demand for water and energy and impacts on agricultural practices. Over the last few decades, the Great Plains have seen fewer cold days and more hot days, as well as an overall increase in total precipitation. The decrease in the cold days has resulted in an overall shortening of the frost-free season by one to two weeks. Within this region, there was an increase in average temperatures 1.5°F from a 1960-1970 baseline to the year 2000 (USGCRP 2014).

Since 1991, the amount of rain falling in very heavy precipitation events in the Great Plains has increased by 21% from 1901-1960 (USGCRP 2014). From 1971-2011, the city of Dallas received an average of 34.9 inches of rainfall annually, an 8.4% increase over the annual rainfall average of the 40 previous years (1930-1970) (National Weather Service 2012). In addition to more extreme rainfall, extreme heat events have also been increasing. Most of the increases of heat wave severity in the U.S. are likely due to human activity, with a detectable human influence in recent heat waves in the southern Great Plains (USGCRP 2014). In particular, in 2011, the State of Texas experienced a heat wave and drought. The growing season and summer were both the hottest and driest on record. Extreme heat events in Texas have also been occurring substantially more frequently. Using historical data, an extreme heat event that was predicted to have a 100-year recurrence (i.e., a 1% annual exceedance probability [AEP]) in 1964 would have only 5- to 6-year recurrence (i.e., a 20% to 17% AEP) in 2008 (Rupp et al. 2012).

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CHAPTER 4 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

4.1.1 Impact Analysis

This chapter analyzes the impacts associated with implementation of two possible alternatives: the Proposed Action and the FWPC. The FWPC is a forecast of the most likely future cumulative conditions that would exist in the Study Area if the Proposed Action is not implemented, but past, present, and reasonably foreseeable future actions associated with projects unrelated to the Proposed Action are implemented (otherwise known as the "no action" alternative). The presentation of the FWPC helps the decision maker understand the future conditions in the absence of the Proposed Action, and how implementation of alternative plans may alter that future condition. Unless otherwise noted, the FWPC is defined as the year 2070; however, some resource areas use a different "future" year; these deviations are noted in their respective sections.

For each resource area, impacts have been presented in a style most suited for that resource. In most cases, this is an analysis of construction and operation of the total project. However, where it has made sense to do so, some impact discussions have been combined. Identified mitigation measures and/or SCMs that would be implemented as part of the selected recommended plan are presented in Chapter 5.

4.1.2 Cumulative Impacts

The cumulative impacts discussion considers a future condition in combination with any identified past, present, and reasonably foreseeable projects. Currently, the USACE management at the Lewisville Lake Office, the LLELA organizations, and LAERF staff have all indicated that they do not have any proposed activities beyond the ongoing maintenance and management that has created the existing conditions described in Chapter 3. The one exception is the revision of the Lewisville Lake Master Plan, which is planned for 2017. However, staff at the Lewisville Lake Office has not indicated that any substantial changes in management or new projects are anticipated for inclusion in the plan at this time. Therefore, in most cases, this is a minimal difference between the proposed action analysis and the cumulative impact analysis, as no projects are being implemented or are being proposed by others within the Project Area. However, resources that have a ROI that extends beyond the Study Area have the potential overlap and thus have cumulative impacts.

4.2 GEOLOGY, TOPOGRAPHY, AND SOILS

4.2.1 Approach to Analysis

In evaluating impacts to topography, geology, and soils, protection of unique geologic features, minimization of soil erosion, and the siting of facilities in relation to potential geologic hazards (i.e., the potential for seismic hazards), and soil limitations are considered. If a proposed action were to substantially affect or be substantially affected by any of these conditions, impacts may be considered significant. Generally, impacts associated with earth resources can be avoided or minimized to a level of insignificance if proper construction techniques, erosion control measures, geotechnical analysis, and structural engineering designs are incorporated into project development.

Analysis of potential impacts to geologic resources typically includes identification and description of resources that could potentially be affected, examination of the potential effects that an action may have on the resources, assessment of the significance of potential impacts, and provision of management measures in the event that potentially significant impacts are identified. Analysis of impacts to soil resources resulting from proposed activities examines the suitability of locations for proposed operations and activities. Impacts to soil resources can result from earth disturbance that would expose soil to wind or water erosion, or otherwise damage soil productivity (e.g., through compaction).

4.2.2 Proposed Action

4.2.2.1 Topography, Geology, and Geologic Hazards

While proposed construction activities and excavation of the borrow pits would require modification of terrain by cut and fill techniques, and temporarily alter the topography in the area surrounding the borrow pits, no significant topographic or geologic features would be affected as a result of implementation of these activities. The existing topography is composed of relatively level unconsolidated terrace and floodplain deposits that have been previously modified and developed. Therefore, no impacts to topography or geology would occur as a result of implementation of the Proposed Action. In addition, the Lewisville Dam is not considered to be in an area with high potential for frequent earthquakes or strong seismic motion, therefore, no impacts resulting from geologic hazards would occur. Additionally, the proposed PFM 8 would reduce the potential for embankment slides and therefore would have a beneficial impact in regard to geologic hazards.

The potential hazard associated with the high clay content of the soils could be mitigated by the use of hydrated lime to prevent or reduce expansion, pre-wetting to increase moisture content, application of protection barriers (coatings and geomembranes) to assist in keeping soil moisture levels constant and prevent infiltration of surface water, and specially reinforced or post-tensioned foundation slabs. Therefore, impacts as a result of high clay content would be less than significant.

4.2.2.2 Formations

The foundations for the intake structure, conduit, outlet works, and spillway all lie on unweathered Eagle Ford Shale, that consists of weathered and unweathered impervious clay shale. Because of its high montmorillonite content (very soft minerals that typically form as microscopic crystals, known as clay), the Eagle Ford Shale is dissimilar to typical shales in the eastern part of the U.S. The clay-shale rapidly disintegrates when submerged in water and when exposed to air. The Eagle Ford Shale is therefore susceptible to swell and significant volume change potential when exposed to air or water, similar to very hard clay found in other parts of the country.

The Eagle Ford Shale provides an excellent foundation with respect to bearing capacity. It is homogeneous, thereby minimizing differential settlement, and it is relatively impervious. However, considerable care during excavation of existing embankment should be given to limit exposure and weathering of the shale foundation surface to air and water.

4.2.2.3 Soils

To varying degrees, most of the soils within the Project Area have been subjected to past and/or ongoing human disturbance from nearby commercial and residential activities, recent long-term cattle grazing, and recreational activities. Furthermore, all of the project features within the Project Area are underlain by highly weathered, high plasticity, high clay fraction ‘soft’ rocks with a significant amount of montmorillonite (>30%) with a high shrink-swell potential. The USACE engineering of proposed elements would consider the risks associated with these soils and design the features to be resilient to potential adverse effects of these clays.

4.2.2.4 Borrow Sites

The proposed borrow sources, Borrow Sites A and B, are located within the Ovan clay soil type on previously disturbed federal property within the Project Area. Surface disturbance from the two borrow sites would be approximately 88.5 acres and a volume of up to 425,000 cubic yards over a period of up to 7 years. Excavation is anticipated to average approximately 7.5 feet deep with some areas 10 to 12 feet deep. However, geotechnical analysis has determined suitable fill to a depth of 25 feet below ground surface. No negative impacts are expected from excavation of fill material up to 25 feet below the ground surface. After the dam safety measures have been implemented, borrow utilized for temporary construction features, such as benching required for PFM 6 and 7, would be returned to the borrow sites. The USACE would contour the borrow sites to resemble the natural surrounding terrain, and seed and plant trees on the disturbed land.

The Proposed Action would temporarily disturb soils during construction. There would be an associated risk of increased rate of erosion and soil loss from physical disturbance with construction activity. However, prior to any construction, clearing, or excavation activities, a construction-specific SWPPP in compliance with the TXR150000 General Construction Permit would be prepared for the area surrounding the Proposed Action per the requirements of the Texas Pollutant Discharge Elimination System (TPDES) program as administered by TCEQ. These plans would include BMPs and monitoring requirements to minimize erosion and sedimentation. Examples of potential BMPs are included in Chapter 5, *Special Conservation Measures*.

Any potential impacts resulting from erosion or temporary increases in surface runoff during construction activities would be minimized by these standard erosion control measures. Consequently, impacts to soils would be less than significant.

4.2.2.5 Cumulative Impacts

No projects aside from the Proposed Action are being implemented or are being proposed within the Project Area, and therefore the cumulative context of the Proposed Action impacts is the same as described above. The Proposed Action would result in a beneficial cumulative impact by reducing on-going erosion and remediating the seepage and hydrological deficiencies of the Lewisville Dam, thereby avoiding the significant impacts of dam failure from flooding, erosion, and sedimentation.

4.2.2.6 Summary

Borrow sites were selected based on suitability of fill and coordination with LLELA organizations and LAERF to identify locations least likely to interfere with sensitive habitats, recreation, and educational usage of Project Area. Material excavated from identified borrow sites would be used within the Project Area. Any excess material would be returned to the borrow sites to moderate changes in topography. The proposed embankment improvements would reduce on-going erosion. Implementation of the Proposed Action would have less than significant impacts on geology, topography, and soils.

4.2.3 Future without Project Condition

Under the FWPC, there would be no change to the geologic character of the area. The topography of the area would largely go unchanged besides on-going dam maintenance, which may slightly alter embankment heights. As shrink-swell potential within the Project Area soils would remain high, geotechnical investigations are anticipated to occur to ensure structure stability for the identified future projects.

Under the FWPC, embankment slides and erosion are anticipated to continue to occur; these areas would continue to be addressed as part of on-going, enduring maintenance activities. Because of ongoing maintenance and response capabilities of the USACE to address slides, this would result in an adverse, but less than significant impact to geology, topography, and soils.

4.3 WATER RESOURCES

4.3.1 Approach to Analysis

The environmental consequences evaluation for water resources includes a qualitative and quantitative analysis of surface water and groundwater resources and water quality to the extent possible given available project data.

The environmental consequences evaluation for H&H includes the application of criteria from the TREIS ROD. The ROD criteria are used to ensure that projects are designed in such a way that there are no flood rises in the water surface profile and that there are no valley storage losses for the 100-year flood event and less than 5% valley storage loss for the SPF event.

4.3.2 Proposed Action

4.3.2.1 Surface Water

Construction associated with PFM 2 would result in temporary impacts to the outlet channel connecting to the Elm Fork Trinity River, which is a jurisdictional water of the U.S. However, there would be no fill or permanent impacts to the outlet channel. Following installation of the filter, the outlet channel would be returned to its current condition.

Construction associated with PFM 4A and 4B would affect wetland areas at associated developed sites and seepage areas; however, these wetland areas are considered non-jurisdictional. Some non-jurisdictional wetland areas would be permanently affected due to alteration of water source (i.e., through modification or control of seepage). Some ponds currently being used at the LAERF facility would no longer function; however, changes in the water lines servicing LAERF would allow water to reach currently dry ponds and bring them into an operable status.

Construction associated with PFM 6 would involve the installation of a geomembrane blanket below grade in an area upstream of the spillway weir and within Lewisville Lake, impacting 0.5 acres of jurisdictional waters of the U.S., or less that 0.1% of the total freshwater emergent wetlands present in the Project Area. The geomembrane would extend upstream approximately 40 feet; however, these impacts would be considered temporary as the geomembrane would be covered with the material removed for its installation as soon as it is installed. If Lewisville Lake water levels inundate the construction area upstream of the spillway weir, a cofferdam would be used.

Construction associated with PFM 7 would occur within and downstream of the existing spillway weir, in a channel considered a jurisdictional water of the U.S. However, impacts to this area associated with the apron overlay would be temporary and would not alter the existing condition of the concrete spillway weir. Impacts associated with the barrier walls would be a combination of temporary and permanent and would total 4.9 acres. Permanent impacts would be up to 1.0 acre to highly disturbed, minimally vegetated freshwater emergent wetland, or 0.9% of the total freshwater emergent wetlands present in the Project Area and less than 0.01% of the total emergent freshwater wetlands present in the Study Area.

Construction associated with PFM 8 would involve the construction of an upstream embankment berm along a portion of the dam. This would result in 5.1 acres of permanent fill of jurisdictional waters of the U.S. associated with Lewisville Lake, however, this proposed fill material would return the dam cross section to original design specifications. There would also be temporary impacts associated with in-water construction. If Lewisville Lake water levels are inundating the construction area upstream of the dam, a cofferdam could be used to minimize potential impacts that would have occurred if lake lowering were required. Although a USACE Section 404 permit would not be issued for the project (the USACE cannot permit its own actions), a Section 404(b)(1) analysis has been prepared and is included in Appendix D. Direct impacts would not be considered significant, as this proposed fill material is considered maintenance of an existing serviceable structure to original design specifications and any impacts would be minimized and avoided, as appropriate.

The borrow sites and associated access roads were sited to avoid and/or minimize environmental impacts, including surface waters and wetlands. Following construction, there would be no further direct disturbance of jurisdictional wetlands and waters of the U.S. Routine maintenance and repairs of the dam facilities would continue as under the existing conditions. Therefore, implementation of the proposed action would result in less than significant impacts to surface water.

4.3.2.2 Groundwater

Excavation would have the potential to intercept shallow groundwater and dewatering may be required, especially for construction associated with PFM 4B and the barrier walls included in PFM 7. However, compliance with the Construction General Permit (TXR150000) and implementation of a SWPPP and associated BMPs would protect groundwater resources during construction (refer to Section 4.2.2.3, *Water Quality*, for details). However, the impacts to this shallow groundwater would be localized and temporary and groundwater would return to pre-construction levels following construction. Construction would have no impact on deeper groundwater aquifers such as the Trinity Group aquifer and the Woodbine aquifer. Following construction, the proposed action would have no impact on shallow groundwater or deeper groundwater aquifers such as the Trinity Group Aquifer and the Woodbine Aquifer.

Therefore, implementation of the proposed action would result in less than significant impacts to groundwater.

4.3.2.3 Water Quality

Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than 1 acre would be required to comply with the Construction General Permit (TXR150000), per the requirements of the TCEQ TPDES program as administered by the TCEQ. Construction activities that result in land disturbance of equal to or greater than 1 acre and less than 5 acres of land are considered “small construction activities.” Construction activities that result in land disturbance of equal to or greater than 5 acres of land are considered “large construction activities.” Construction activities as part of this project would disturb more than 5 acres of land, and would therefore comply with the requirements of a large construction activity. Before construction, a NOI would be submitted to TCEQ for compliance with the General Stormwater Permit for Construction Activities and a SWPPP would be developed for the project.

Construction activities may result in the generation of pollutants including sediment and other construction-related constituents (such as nutrients, trace metals, oil and grease, miscellaneous waste, and other toxic chemicals). Without controls, the pollutants could potentially enter receiving waters. The

SWPPP would outline site-specific BMPs in accordance with TXR150000, which would minimize erosion and the potential for sediment and other pollutants to enter receiving waters during construction activities. BMPs include schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas (TCEQ 2013).

BMPs such as cofferdams, turbidity curtains, and appropriate dewatering measures would be implemented for in-water work. Additional erosion control and stabilization practices may include but are not limited to: establishment of temporary or permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of existing trees and vegetation, slope texturing, temporary velocity dissipation devices, flow diversion mechanisms, silt fencing, sediment traps, the application of water sprays, and the prompt revegetation of disturbed areas. These measures would reduce potential impacts to water quality. Implementation of sediment and erosion controls during construction activities would maintain runoff water quality at levels comparable to existing conditions.

Following construction, routine maintenance and repairs of the dam facilities under the proposed action would comply with all applicable CWA and TCEQ requirements and regulations.

Therefore, implementation of the proposed action would result in less than significant impacts to water quality.

4.3.2.4 Hydrology and Hydraulics

The construction under the Proposed Action would not result in any substantial fill in the floodplain of the Elm Fork of the Trinity River. There would be temporary construction on the spillway weir under PFM 6 and PFM 7, but the weir would remain operational during the construction period and the repair work would not affect the flood control operations of Lewisville Dam. Excavation at the borrow pits would remove material from the floodplain, resulting in a minimal increase in floodplain storage. Once modifications to Lewisville Dam are complete, the reservoir would continue to operate as under existing conditions, providing flood control benefit to downstream areas (refer to Section 3.3.4.4). The Proposed Action would be required to comply with the TREIS ROD criteria, which would ensure that there would be no increased risk of flooding due the Proposed Action. Therefore, implementation of the Proposed Action would result in less than significant impacts to H&H.

4.3.2.5 Floodplains

As discussed in Section 4.2.2.4, construction under the Proposed Action would not result in a substantial increase in downstream flooding during the 100-year flood event. There would be some permanent fill in the 100-year floodplain associated with the barrier wall in PFM 7 and the embankment modifications under PFM 8. The fill associated with PFM 7 would be negligible compared to the overall storage capacity of the spillway channel. However, the barrier wall would slow water through the channel. While this slowing may result in water staying in the floodplain longer, the reduction of erosion and scour within the channel would result in a better functioning floodplain overall. PFM 8 fill would occur within Lewisville Lake and fill would be negligible compared to the overall flood storage capacity of the reservoir. The borrow pits would be located within 100-year floodplain, but this area would undergo excavation and there would be no net fill in the floodplain (see Figure 3.3-3). Therefore, the Proposed Action would be in compliance with EO 11988 and would result in less than significant impacts to floodplains.

4.3.2.6 Cumulative Impacts

No projects aside from the Proposed Action are being implemented or are being proposed within the ROI for surface water, groundwater, water quality, and floodplains, and therefore the cumulative context of the Proposed Action impacts is the same as described above.

The ROI for H&H is undergoing substantial change through population growth as well as changes to the Trinity River itself. Downstream of the Proposed Action, the Dallas Floodway Project and the Trinity Parkway would both have less than significant impacts to H&H within the watershed. The contribution of the Proposed Action to the watershed H&H is insubstantial when considering the cumulative impacts of these larger projects. Therefore, implementation of the Proposed Action and the other past, present, and reasonably foreseeable projects would result in less than significant impacts to H&H.

4.3.2.7 Summary

Temporary impacts to emergent wetlands and temporary impacts to open water are anticipated during construction. Surface runoff and drainage would be impacted with the use of the borrow sites, however implementation of BMPs would reduce the impact. Use of a cofferdam for any activities on the upstream side of the dam avoids and minimizes potential impacts. Implementation of the Proposed Action would have less than significant impacts to surface water, ground water, wetlands, floodplains, and water quality.

H&H modelling continues to be in development; however, preliminary modelling suggests that there would be no significant impact as the proposed action would not substantially alter the hydrograph associated with releases from Lewisville Lake.

4.3.3 Future without Project Condition

4.3.3.1 Surface Water Resources

It is not anticipated that wetlands within the Project Area would degrade under the FWPC. It is anticipated that current restoration and enhancement efforts performed by LLELA and LAERF would continue to improve wetland habitats below Lewisville Dam. Lake operation and maintenance activities are not expected to alter the current wetlands within the project lands. All other future projects that may cross project lands within the Project Area would be subject to USACE regulatory permitting authority for impacts to wetlands and would be mitigated accordingly.

Although LLELA projects include the wetland restoration and bottomland hardwood forest restoration within the existing floodplain, the Lewisville Dam will continue to block upstream sediments from flowing downstream and reducing the replenishment of the floodplain in the FWPC.

4.3.3.2 Groundwater Resources

Some of the state’s largest subsurface water level declines have occurred within the Trinity and Woodbine Aquifers, particularly along the IH-35 corridor. These declines can be attributed to the increase in population and development within the metroplex resulting in increased municipal groundwater pumping. Over the past decade, the drop in the aquifer water levels has slowed as reliance on surface water sources have increased. The 2016 Region C Water Plan (Region C Water Planning Group 2015) recommends numerous water management strategies for the Trinity and Woodbine Aquifers, including developing new wells and well fields, pumping more water from existing wells, overdrafting, reallocating supplies, and using surface water and groundwater conjunctively. Combined with an increased probability of the frequency and intensity of drought events due to climate change, these water management strategies may further impact groundwater resources in the future.

4.3.3.3 Water Quality

Under the FWPC, increased urbanization in the Upper Trinity River watershed and the potential for release of pollutants into stormwater runoff would increase. Also, the presence of zebra mussels within Lewisville Lake and ultimately downstream is expected to increase as zebra mussels are presently documented upstream from Lewisville Lake. Given certain environmental conditions, in combination with zebra mussel feeding activities, an increase in blue-green algae blooms both in intensity and duration could possibly be experienced. State and Federal agencies (e.g., TCEQ and USEPA) would continue to update and enforce regulations to address and minimize the effects of these pollutants on water quality. Therefore, conditions affecting water quality that is currently listed as not impaired or listed as a concern, are expected to remain the same or gradually improve over time. In addition, restoration efforts on project lands by LLELA and LAERF could potentially help improve water quality of surface waters within the Project Area by improving wetland and riparian buffer habitats.

4.3.3.4 Hydrology and Hydraulics

The downstream floodplains of the Elm Fork and Trinity Rivers in Denton and Dallas counties are already built out, and any future development changes would primarily be the replacement of existing development with similar land uses due to current land use zoning regulations and adjacent landowner pressures.

Some tracts of land in southeastern Dallas County may experience new development, as the Dallas/Fort Worth Metroplex expands in that direction. Future new development in this area would increase the impermeable surface area and in turn increase the runoff consequences under the FWPC, but the increase may be small relative to the huge consequences already being calculated under existing conditions.

The Dallas Floodway Feasibility Study identified over 40 projects that have been planned for construction and were included in FWPC of that study. The locations of these projects are in the floodplain of the Trinity River (specifically the Dallas Floodway corridor), which is about 30 miles downstream of Lewisville Dam. The projects primarily consist of small public infrastructure improvements like bridge replacements, utility relocations, and pump stations. They also include the Trinity Parkway, which is a new toll road located along the East Levee, and the City of Dallas' Balanced Vision Plan, which will reshape the entire Dallas Floodway into a series of ponds and parks.

All of the above projects have been hydraulically modeled in detail as part of the Dallas Floodway Feasibility Study, and have been determined to pose no additional risk to the Dallas Levees or the populations upstream and downstream of the projects. The reason they pose no significant additional risk is because all of the above projects have been designed with the Upper Trinity River ROD hydraulic criteria in mind. These requirements greatly limit any potential upstream or downstream impacts to flood risk, and they continue to govern all new development in the Upper Trinity floodplain. The ROD criteria will help to keep future flood risk very close to the level of current flood risk, which may lead one to conclude that there is no need for additional hydraulic modeling for Lewisville's FWPC.

Two future levee projects have also been planned, which would have the effect of decreasing flood risk for the populations protected by them. The first is the Flood Risk Management portion of the Dallas Floodway project, which includes a levee raise and a bridge modification. These two elements would decrease the frequency at which the Dallas Floodway Levees are overtopped. The second is the new Lamar Street Levee, which is planned for construction as part of the USACE's Dallas Floodway

Extension project. The Lamar Street Levee will tie directly to the East Levee at the downstream end of the Dallas Floodway and protect additional structures on the left overbank of the Trinity River. These two projects would have the effect of decreasing consequences from Lewisville Dam, but that decrease would likely be counteracted by additional development in other parts of the Trinity floodplain.

4.3.3.5 Floodplains

As discussed in Section 4.3.3.4, future new development in this area would increase the impermeable surface area and in turn increase the runoff consequences under the FWPC, but the overall floodplain inundation maps for the FWPC would effectively be the same as those presented in Existing Conditions (see Figure 3.3-3).

4.4 BIOLOGICAL RESOURCES

4.4.1 Approach to Analysis

The impacts of the alternatives have been assessed primarily through the application of the USFWS HEP and IBI to the ROI to: (a) quantitatively characterize existing fish and wildlife resources in the ROI in terms of acreage and habitat values; and (b) to estimate the area and condition of those resources over time in the future in order to compare quantitatively the net gains and losses of habitat that would occur under the different alternatives. This analysis is included in the PAR (Appendix C).

The HEP and IBI evaluates changes in habitat acreages and values (as measured by HSIs) over a 50-year period that begins at the conclusion of construction (Year "0"). Details of the HEP analysis are provided in the PAR (USFWS 2016a). In addition to the broad, quantitative aspects of the HEP, the analysis also considers potential impacts on special status species or potential impacts that may result from invasive species.

Under NEPA, the significance of project impacts is a function of context and intensity. For biological resources, context refers to the importance (ecological, commercial, scientific, recreational, etc.) or regulatory (i.e., legally protected) status of the resource, and intensity refers to the magnitude – scale and duration – of the impact. Both beneficial and adverse impacts are recognized; either can be significant. In the ROI, the habitats of greatest importance are aquatic riverine, emergent wetlands, and bottomland hardwoods. Substantial long-term net changes in the acreage and/or value of these habitats would likely result in significant impacts; impacts to open water and grassland habitats are of lesser concern and unlikely to be significant, especially if areas of these habitats are converted to more valuable habitat. Losses or gains of population and habitat for special status species may also be significant, depending on the magnitude of the impact relative to the population size and distribution of the species in the region. Finally, an impact that led to new introductions or the expansion of invasive species in the ROI would also be considered significant in terms of potential far-reaching effects on the ecosystem as a whole.

4.4.2 Proposed Action

4.4.2.1 Construction

In the course of project construction, terrestrial habitat within the action area would be lost. Aquatic habitat would be avoided. As part of the Habitat Measures project feature, borrow sites would be graded to be continuous with existing surface contours, and planted with native grasses, forbs, shrubs, and trees. The majority of the habitat impacted would be low quality savanna and grassland. With seeding, the grassland habitat would return. BMPs and SCMs would be implemented to minimize impacts to aquatic habitat and wetlands to the greatest extent possible.

Fish and Wildlife Management

During the construction of the safety modifications, terrestrial wildlife would temporarily be affected in the action area. Most, if not all species would recolonize the area after construction. Minimal impacts to fish and other aquatic species are expected, as most construction would avoid aquatic habitats. Furthermore, identified BMPs and SCMs (see Chapter 5) would minimize potential construction-related indirect impacts to aquatic areas. Impacts to nesting bird species would be minimized to the greatest extent possible. If proposed construction activities occur during the avian breeding season (February 15 through August 31), construction activities would apply SCMs identified in Chapter 5 to comply with the MBTA to avoid impacts to nesting migratory birds within the ROI.

Special Status Species

No federally- or state-listed species are known to reside or breed in the Project Area. Based on a review of impacts described here and in the 2016 PAR, USFWS has determined that the Proposed Action may effect, but is not likely to adversely affect interior least terns. The Proposed Action would not have an effect on any other federally-listed species. The analysis in this EA and Appendices C and D serves as the Biological Evaluation for USFWS review of the effects determination.

Some of the BCC bird species listed in Section 3.4 are likely to occur in the area. If these species occur in the area during construction, they could fly to other areas. If proposed construction activities occur during the avian breeding season (February 15 through August 31), construction activities would comply with the MBTA to avoid affects to nesting migratory and/or special status birds within the ROI. Any impacts to special status species during the construction and operation of the Proposed Action would be minimized through the implementation of SCMs.

Invasive Species

Monitoring for invasive species and the application of appropriate control measures would minimize the risk from invasive species. SCMs would be implemented to minimize the spread of invasive species during construction and operation of the proposed project features.

4.4.2.2 Operations

Immediately after the implementation of the Proposed Action, the amount of terrestrial habitat acreage in the Project Area would decrease. The greatest decrease of habitat acreage would be to savanna habitat, followed by grasslands and upland forest. Wetlands would be the least impacted due to the minimal amount of wetland habitat found in the action area. Lacustrine and riverine habitat would be maintained.

Beyond Year 0, changes in habitat from both project impacts and natural successional process are anticipated. The degree of change is directly connected to the source of impacts. Terrestrial habitats impacted by permanent, constructed site features would become urban cover type. This accounts for 11.2 acres of grassland and 0.2 acre of savanna that would become urban. All the grassland impacted is currently considered “improved grassland” and is currently mostly comprised of nonnative grasses that are frequently mown.

Terrestrial habitats impacted by the temporary access road, staging, and stockpiling would slowly return to their pre-project habitats, with the exception of riparian woodlands. Grassland habitat would return most rapidly, as the disturbed areas would be seeded at the conclusion of activities. Because of the rapid conversion of riparian woodlands currently observed in the Project Area, it is unlikely that riparian woodlands would re-establish after being impacted within the action area. Instead, these areas are likely to return and trend toward upland forest.

Terrestrial habitat impacted by the maintenance activities that would re-establish the vegetative clear zone would become grassland. This area would be subject to regular mowing as part of standard operations and maintenance at Lewisville Dam. The area impacted by this activity includes 0.3 acre of riparian woodland, 1.4 acres of savanna, and 2.4 acres of upland forest. The vegetation clear zone also includes 23.0 acres of grassland that would continue as grassland and 2.4 acres of urban land that would likewise be unchanged.

Terrestrial habitat impacted by the borrow sites would be re-established under the habitat measures project element. The result would be that Borrow Sites A and B would be developed as high-quality savanna that would be actively managed to minimize tree and shrub encroachment and to foster pollinator habitat. These areas include 2.0 acres and 27.7 acres of upland forest in Borrow Site A and B, respectively, which would become savanna.

Habitat Assessments

Table 4.4-1 presents the Proposed Action HSIs, acres, and HUs for the action area for riparian woodland, upland forest, wetland, grassland, savanna, and riverine habitat over the next 50 years. With the implementation of the Proposed Action, borrow material would be excavated from the action area, temporarily disturbing the habitat. Following the implementation of the Proposed Action (years 0, 1, and 5), the upland forest, wetland, grassland, and savanna habitat HSIs would be low because the habitats would have just been created and would take time to become established. The riparian woodland habitat is not expected to re-establish. The HSIs for upland forest, grassland, and savanna habitats are expected to increase over time as vegetation takes root and the trees mature. Because the top soil will be replaced, and native seeding and tree planting is proposed, habitat quality in 50 years is expected to exceed existing conditions. Wetland HSIs are expected to increase over time to attain existing condition levels as the wetlands have a chance to recover and become more established.

Aquatic riverine IBIs may decrease initially after project completion, as activities associated with PFM 2 could reduce the amount or quality of shallow riffle-pool habitat found within the upstream portion of the Project Area. Consequently, the existing fish-community structure could be temporarily altered or displaced by construction activities associated with the Proposed Action. However, the water flow would be maintained at or near current flow levels, aiding in the recovery of the stream channel. By year 50, the aquatic riverine IBI is expected to increase due to increased regulations and technology for improvements to water quality.

Table 4.4-1. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the Proposed Action Alternative

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Riparian Woodland							
HSI	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Acres	7.6	0.0	0.0	0.0	0.0	0.0	0.0
HUs	3.42	0	0	0	0	0	0
Upland Forest							
HSI	0.30	0.00	0.00	0.00	0.00	0.04	0.41
Acres	48.1	0.0	0.0	0.0	14.8	28.1	52.0
HUs	14.43	0	0	0	0	1.12	21.32

Table 4.4-1. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the Proposed Action Alternative

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Wetland							
HSI	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Acres	0.3	0.0	0.3	0.3	0.3	0.3	0.3
HUs	0.06	0	0.06	0.06	0.06	0.06	0.06
Grassland							
HSI	0.48	0	0.28	0.34	0.39	0.42	0.54
Acres	77.2	0.0	236.2	132.9	119.6	95.7	76.6
HUs	37.06	0	66.14	45.19	46.65	40.2	41.37
Savanna – Habitat Measures							
HSI	-	0.00	0.00	0.10	0.29	0.44	0.59
Acres	-	0.0	0.0	88.5	88.5	88.5	88.5
HUs	-	0	0	8.85	25.67	38.94	52.22
Savanna – All Other							
HSI	0.29	0.00	0.00	0.20	0.27	0.29	0.30
Acres	114.7	0.0	0.0	14.8	13.3	23.9	19.1
HUs	33.26	0	0	2.96	3.59	6.93	5.73
Riverine							
HSI	0.86	0.65	0.68	0.75	0.83	0.87	0.88
Acres	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HUs	0.43	0.33	0.34	0.38	0.42	0.44	0.44

Riparian Woodland. The acreage of riparian woodland habitat under Proposed Action Alternative would be eliminated from the action area. During the excavation of the action area for borrow material, existing forest would be removed. Following the completion of the project (Year 0), the area would be bare, but the top soil replaced, and the area seeded for grassland and savanna growth. Riparian woodland impacted by the creation of the vegetative clear zone would be permanently converted to grassland. Riparian woodland impacted by the borrow areas would be entirely converted to savanna by the habitat measures project element.

Riparian woodland impacted by temporary access, staging and stockpiling areas would be reseeded with native grasses and forbs and allowed to develop naturally. While a portion of the grassland habitat is expected to convert to savanna (of which a portion will then convert to upland forest), it is doubtful that riparian woodland forest would develop. As observed between the 2010 and 2014 field efforts, much of the riparian woodland is converting to upland forest. This is consistent with anecdotal observations by long-term Lewisville Lake staff of an ongoing trend of riparian and similar water-dependent habitat within the Project Area developing into upland habitats favored by drier conditions. Furthermore, as presented in the 2014 National Climate Assessment, drier conditions in the region are anticipated to persist, and thus it is unlikely that riparian woodland would re-establish in the area within 50 years.

Upland Forest. Upland forest habitat under Proposed Action would be eliminated from the action area (an initial loss of 48.1 acres). During the excavation of the action area for borrow material, mature forest would be removed. The top soil would be retained, however. Following the completion of the project

(Year 0), the area would be bare, but the top soil would be replaced and the area seeded for grassland. Upland forest impacted by the creation of the vegetative clear zone would be permanently converted to grassland. Upland forest impacted by the borrow sites would be entirely converted to savanna by the habitat measures project element.

Upland forest impacted by temporary access, staging and stockpiling would be reseeded with grasses and forbs and allowed to develop naturally. Once established and without controlled burns, some areas of grassland habitat would become savanna as trees become established. As trees continue to establish in new areas and canopy cover increases, more grassland would be converted to savanna, and some areas of savanna would be expected to convert to upland forest beginning after about 10 years.

Wetland. Wetland habitat under Proposed Action would be temporarily degraded in the action area during project implementation (an initial loss of 0.3 acres). Impacts from construction would impair water flow and quality, and impacts from construction vehicles traversing the area would damage herbaceous vegetation growth. Following the completion of the project (Year 0), the impacted area would be restored to its original topography, scarred and seeded to aid in the re-establishment of vegetation. The wetlands within the action area are generally comprised of early colonizing emergent vegetation, such as cattails. The frequent flooding within the area, combined with the restoration of topography and rapid colonization by vegetation would contribute to rapid recovery of these systems within 1 year.

Grassland. Grassland habitat under Proposed Action would be eliminated from the action area (an initial loss of 77.2 acres). Following the completion of the project (Year 0), the action area would be bare, but the top soil would be replaced and the area seeded with native herbaceous vegetation for grassland growth. It is estimated that without controlled burns, a portion of the grassland habitat established within the areas disturbed by temporary access, stockpiling and staging would progress to savanna habitat each year as a result of ecological succession. Grasslands that are part of the embankment, vegetation clear zone, and utility rights-of-way would persist as “improved grassland.”

Savanna. Savanna habitat under Proposed Action would be eliminated from the action area (an initial loss of 114.7 acres). During the excavation of the action area for borrow material, trees, shrubs, and herbaceous vegetation would be removed. The top soil would be retained, however, and used during the implementation of the habitat measures project element. At Year 0, the savanna habitat established under the habitat measures would be seeded and planted with native trees, but would not yet be functioning savanna habitat. As trees and herbaceous vegetation becomes established, the habitat measures areas would be actively maintained with integrated pest management and periodic prescribed burning to maintain a healthy functioning savanna that would support a robust pollinator community.

Savanna impacted by the vegetation clear zone would be entirely converted to improved grassland. Savanna impacted by temporary access, stockpiling, and staging areas would be bare at project completion, but the top soil replaced and the area seeded for grassland growth. It is estimated that without controlled burns, a portion of the grassland habitat would progress to savanna habitat each year as a result of ecological succession. Similarly, a percentage of the savanna habitat would be expected to convert to upland forest each year after about 10 years. Savanna habitat is expected to persist in areas that do not retain as much soil moisture.

Lacustrine. The acreage of lacustrine habitat would be unchanged as the entirety of this habitat is within the footprint of the lake for flood stage. It is possible that the action area of lacustrine habitat would be dry more often, but maintenance of the area to ensure proper spillway functioning would preclude any substantial change in habitat from existing conditions.

Riverine. The acreage of riverine habitat would be unchanged by the Proposed Action. The habitat has a constant, controlled water supply fed directly from the outlet structure for Lewisville Lake. The water supply regime would not be affected by the Proposed Action.

Fish and Wildlife Management

The impacts to fish and wildlife under the Proposed Action would be similar to the impacts from the current operations and maintenance regime. Wildlife that was displaced by construction would be expected to return to the Project Area. Common birds, amphibians, reptiles, and mammals adapted to human disturbance would continue to use the terrestrial habitat.

The habitat measures would be adaptively managed by the LLELA organizations (including the USACE) to establish a savannah habitat that would support a robust and diverse community of pollinators. As the vegetation is established, wildlife that uses the planted grasses, forbs, shrubs, and trees for forage and/or shelter would migrate into the area.

Special Status Species

The potential for threatened or endangered species, or BCC within the Project Area under the Proposed Action Alternative is anticipated to be the same as under current conditions.

The Proposed Action Alternative would create higher habitat values than both those of the existing conditions and those predicted under the FWPC. However, as under the FWPC, federally-listed species are not likely to breed or establish permanent residences in the Project Area under the Proposed Action Alternative.

4.4.2.3 Cumulative Impacts

No projects aside from the Proposed Action are being implemented or are being proposed within the Project Area, and therefore the cumulative context of the Proposed Action impacts is the same as described above. LAERF and LLELA organizations would continue operating within the Project Area, including on-going habitat restoration operations. The USACE would coordinate with LLELA organizations and with LAERF to ensure the success of the Habitat Measures savanna improvements, as well as continuity of the Habitat Measures with the restoration activities that may be proposed by LLELA organizations in the future. Therefore, beneficial impacts to area habitats are expected to occur.

4.4.2.4 Summary

As summarized in Table 4.4-2, implementation of the Proposed Action would result in a net increase in Project Area HUs, primarily through the implementation of the Habitat Measures element, which would also create high value habitat for pollinators in the region. This element would result in a more diverse and high quality landscape as compared to the poor quality grassland and upland savanna currently observed. It is unlikely that any federally listed threatened or endangered species would be present in the Project Area, and thus are not likely to be impacted. Therefore, implementation of the Proposed Action would result in a beneficial impact to biological resources.

Table 4.4-2. Estimated HU Values for Habitats within the Action Area under Baseline and Proposed Action Alternative (Year 50)

Habitat	*HUs*		
	Baseline	*Proposed Action*	*Change*
Riparian Woodland	3.42	0.00	-3.42
Upland Forest	14.43	21.32	6.89
Wetland	0.06	0.06	0.00
Grassland	37.06	41.37	4.31
Savanna – Habitat Measures	-	52.22	52.22
Savanna – All Other	33.26	5.73	-27.53
Riverine	0.43	0.44	0.01
Total HU	**88.66**	**121.14**	**32.48**

4.4.3 Future without Project Condition

4.4.3.1 Aquatic Habitat

Because the Project Area is located within the Lewisville Lake project boundary, operation and management of the area would be expected to be consistent with current conditions. In addition, the LLELA has established several aquatic habitat restoration and improvement projects that would increase aquatic habitat quality within the Project Area. These projects include aquatic invasive species control, wetland restoration plantings, and erosion control. Therefore, the quality of aquatic habitat within the Project Area is expected to increase under the FWPC.

4.4.3.2 Terrestrial Resources

Vegetation

LLELA has been and continues to restore native woodland and native prairie habitats through seeding, planting, prescribed burns, brush control, and invasive species management. As these efforts bring the environment closer to pre-settlement conditions, the vegetation structure and diversity is expected to increase in quality in the FWPC.

Habitat Assessments

Within the Project Area, substantial change was observed between the site visits supporting the 2011 PAL and those for the 2014 PAL. The most notable observed change was the substantial drying of riparian woodland (referred to interchangeably in the 2011 PAL report with bottomland hardwood) into upland forest currently observed at the site. Within all of LLELA, more than 70% of what had previously been considered riparian woodland is now considered upland forest. Grassland was also observed to be developing into savanna, and savanna into upland forest. Overall, upland forest has increased by more than 700% in the last 8 years. This is consistent with anecdotal observations by long-term Lewisville Lake staff of an ongoing trend favoring drier upland habitats.

Under the FWPC, climate change is expected to create warmer (increases in temperature) and drier (decreases in precipitation) conditions in the region (USGCRP 2014). The riparian woodland currently remaining is limited to drainages, and—assuming no major disturbance—is expected to persist with the support of annual flooding. Tree encroachment observed in the savanna habitat is already somewhat high, with tree canopy closure at 28%, and this trend is expected to continue, resulting in savanna rapidly trending towards upland forest. Grasslands are expected to undergo less successional development, as the improved grasslands would continue in their current operations and maintenance regime. LLELA organizational treatments of grasslands (including periodic controlled burns to limit shrub encroachment) are also expected to continue.

Table 4.4-3 presents the HSIs, acres, and HUs under the FWPC alternatives for the habitats found in the action area over the next 50 years. The habitat in the Project Area has existed in a partially maintained and partially natural condition since the dam was built in 1955; therefore, the HSIs are expected to change very little over the next 50 years. The quality of riparian woodlands and upland forests is expected to increase over the next 50 years, as the forested habitats mature and key variables determining suitability of the habitat improve (e.g., average dbh would continue to increase as trees age). Grasslands would increase slightly, as ongoing maintenance would improve herbaceous canopy cover, a key variable to eastern meadowlark habitat. Savanna habitat would also increase in quality, as increasing shrub cover, as it currently observed to be occurring, would improve habitat for eastern cottontail. Increased shrub cover would also reduce the quality for the eastern meadowlark, but the gains in the modelling for the eastern cottontail are greater than the losses projected for the meadowlark. Riverine habitats are expected to improve more gradually due to increased regulations and technology for improvements to water and air quality.

Table 4.4-3. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the FWPC

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Riparian Woodland							
HSI	0.45	0.45	0.45	0.46	0.49	0.53	0.58
Acres	7.6	7.6	7.6	7.6	7.6	7.6	7.6
HUs	3.42	3.42	3.42	3.5	3.72	4.03	4.41
Upland Forest							
HSI	0.30	0.30	0.30	0.31	0.33	0.38	0.40
Acres	48.1	48.1	53.8	64.7	74.5	92.2	106.3
HUs	14.43	14.43	16.14	20.06	24.59	35.04	42.52
Wetland							
HSI	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Acres	0.3	0.3	0.3	0.3	0.3	0.3	0.3
HUs	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Grassland							
HSI	0.48	0.48	0.48	0.48	0.48	0.48	0.49
Acres	77.2	77.2	77.2	77.2	77.2	77.2	77.2
HUs	37.06	37.06	37.06	37.06	37.06	37.06	37.83
Savanna							
HSI	0.29	0.29	0.29	0.30	0.30	0.31	0.31
Acres	114.7	114.7	109.0	98.1	88.3	70.6	56.5
HUs	33.26	33.26	31.61	29.43	26.49	21.89	17.52

Table 4.4-3. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the FWPC

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Riverine							
IBI	0.86	0.86	0.86	0.86	0.86	0.87	0.88
Acres	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HUs	0.43	0.43	0.43	0.43	0.43	0.44	0.44

As presented in Table 4.4-3, HUs would change more for some habitats than others in 50 years under the FWPC. Left undisturbed, savannas are anticipated to continue to develop into upland forests, causing a decrease in savanna HUs and an increase in upland forest HUs. Riverine HUs in the action area would increase very slightly in 50 years due to an increase in the IBI as a result of increased regulations and technology for improvements to water quality. Grasslands are expected to slightly increase in 50 years due to increases in the HSI values in the habitats.

4.4.3.3 Wildlife

Under the FWPC, wildlife habitat is expected to improve with ongoing and future habitat improvements implemented by LLELA. As a result, the existing population and diversity of wildlife population within the Project Area is expected to continue, and possibly improve under FWPC.

4.4.3.4 Fish and Wildlife Management

Under the FWPC, the USACE and LLELA would continue to actively manage the Project Area for propagation of species and wildlife habitat maintenance or improvement as appropriate. Licenses, permits, or easements are not anticipated for such man-made intrusions as underground or exposed pipelines, cables, overhead transmission lines, or non-project roads. Public access to wildlife management lands may be restricted at certain critical periods when wildlife would otherwise be adversely affected, such as during critical breeding, nesting, and spawning periods.

4.4.3.5 Special Status Species

Some special status species listed in Section 3.4 are likely to occur in the ROI. Close coordination among the USACE, USFWS, and TPWD would continue as part of overall management of the Project Area and normal operation and maintenance activities for Lewisville Lake. Through continued restoration efforts by LLELA and USACE staff, it is reasonable to expect habitat conditions to continually improve for many special status species such as, but not limited to, bald eagle and Texas garter snake. However, if a sustained, robust population of zebra mussels establish within Lewisville Lake, detrimental impacts to native mussel species, such as the Texas heelsplitter, may occur through loss of habitat and food resources by being out competed by the zebra mussel population.

4.4.3.6 Invasive Species

Through the use of ongoing control efforts and standard lake operations, it is not anticipated that vegetative invasive species would substantially spread under the FWPC.

4.5 PUBLIC HEALTH AND SAFETY

4.5.1 Approach to Analysis

The USACE Risk Assessment includes thresholds for societally tolerable risk. For additional information regarding the development and establishment of these thresholds, refer to the Dam Safety Action Decision Summary for Lewisville Dam (USACE 2016).

4.5.2 Proposed Action

4.5.2.1 Construction

Under the Proposed Project Alternative, construction activities would occur at the dam and would include fencing and signage to keep the public away from potential harm. The construction contractor, in coordination with the USACE, would complete all health and safety plans and receive approval from the USACE prior to construction. The contractor would also make certain all safety protocols, and standard operating procedures are in place to ensure the safety of not only the general public but also the contractors.

Construction vehicle access to and collection of material from the borrow pits would be staged to avoid interruption of LLELA's normal daily operations when there would likely be many adults and children present.

On-going coordination would occur with all municipalities (particularly emergency departments for the City of Lewisville and The City of The Colony located within and immediately adjacent to the Project Area), utilities, and stakeholders (including LLELA) regarding details of construction (schedule) and alternate public access roads during the construction process to ensure public health and safety.

4.5.2.2 Operations

Daily operations of Lewisville Dam would result in beneficial impacts to public health and safety by improving the stability of the dam following construction. Daily inspections would continue as a normal operating procedure to ensure the dam is functioning efficiently and minimizing impacts to the public from flood risks and dam instability in general.

With the implementation of the Proposed Action, seepage under the dam would be reduced, and thus the probability of failure at the PFM 4A and 4B sites would likewise be reduced. Furthermore, with the application of PFM 6 and PFM 7, the stability of the spillway would be improved, and the probability of spillway failure would be substantially decreased. The combinations of measures addressing the four risk-driving PFMs would significantly reduce the probability of dam failure and therefore likewise substantially reduce the risk to life and property loss. Furthermore, implementation of PFM 8 would reduce the need for emergency response and repairs of the embankment by reducing the potential for embankment slumps and slides.

4.5.2.3 Cumulative Impacts

Several planned or proposed regional transportation projects would strengthen the overall regional linkages within the Study Area by implementing designs to alleviate traffic congestion and improve access and linkages across the ROI. Implementation of these transportation-centric future projects would facilitate shorter response times by some emergency services providers to a major flood event, thereby beneficially affecting this aspect of their ability to respond to the affected area(s).

4.5.2.4 Summary

Implementation of the Proposed Action would result in improved embankment stability and resiliency, and would reduce risk and potential for emergency management measures by the USACE. Therefore, implementation of the Proposed Action would result in a beneficial impact to public health and safety.

4.5.3 Future without Project Condition

Under the FWPC, the safety and health of the public would continue to be a priority for the USACE. Daily inspections of the known issues and careful evaluation and search for any potential new issues with the performance of the dam would continue. The USACE O&M activities would continue and be responsive to any changing conditions observed in the course of monitoring and/or inspections. The USACE would work with FEMA to ensure that the safety of the public is paramount should the function of the dam be compromised or damaged.

All emergency services within Denton County and specifically the communities within the City of Lewisville and City of The Colony would continue to operate as normal and would also work with the USACE and FEMA to ensure the continued health and safety of the public if flooding occurs as a result of dam instability. However, emergency response, in general, would be challenged by a major flood event, even with the regular updates to applicable emergency response plans and maintenance of existing communications protocols.

While the probability of dam failure would remain remote, the risk associated with failure would increase, as the increasing population within the Study Area would result in increased consequences in the event of dam failure. This stress to all aspects of emergency response indicates that the FWPC would result in an adverse impact on the public safety of the Study Area. The municipalities within the Study Area would continue to implement the flood warning systems described in their Emergency Action Plans. Therefore, under the FWPC, no significant impact to public safety would occur.

4.6 AIR QUALITY

Air quality impacts within the affected environment were reviewed for significance in light of federal air pollution standards and regulations. Potential air quality impacts include: (1) exceeding the General Conformity Rule *de minimis* thresholds for the ozone precursors VOCs or NO_x, or (2) increasing net mobile source emissions in excess of 250 tons per year for SO_2, CO, $PM_{2.5,}$ or PM_{10}.

Pollutants considered in this analysis include the criteria pollutants, excluding lead (airborne emissions of lead are not included because there are no known significant lead emission sources in the region or associated with the Proposed Action). For CO and PM_{10} emissions, 250 tons per year per pollutant was used as a comparative analysis threshold. This value is used by the USEPA in their NSR Standards as an indicator for impact analysis for listed new major stationary sources in attainment areas. No similar regulatory threshold is available for mobile source emissions, which are the primary emission sources for the Proposed Action. Lacking any mobile source emissions thresholds, the 250 tons per year major stationary source threshold was used to equitably assess and compare mobile source SO_2, CO, $PM_{2.5,}$ and PM_{10} emissions.

Air quality impacts were assessed by comparing the emissions generated by the construction activities to these defined thresholds. Construction emissions would result in a short-term increase in emissions within the Lewisville environs.

4.6.1 Approach to Analysis

Because the emission sources for the Proposed Action are mobile sources, the evaluation is based on types of equipment, their horsepower rating, and the number of hours they are anticipated to operate over the project period, which for Phase 1 encompasses FY 2018 – FY 2020 and for Phase 2 encompasses FY 2022 – FY 2025. Construction equipment emissions were calculated using 2010 Technical Documents published by USEPA for their NONROAD 2008 model. These documents are identified in the Air Quality appendix (Appendix E). Emissions for the entire seven-year period were calculated and subdivided into annual emissions. Details on the calculations can be found in Appendix E. The results of the analysis have been compared to applicable General Conformity thresholds.

4.6.2 Proposed Action

4.6.2.1 Phase 1

Phase 1 includes building a collection trench and inverted filter berm, installation of a geomembrane blanket, installation of concrete apron slabs in the spillway area, and embankment berming. In addition to onsite construction equipment, other mobile sources include delivery trucks bearing construction materials and concrete trucks. These material deliveries were conservatively estimated to originate from the Dallas area, with a roundtrip distance of 80 miles. Table 4.6-1 lists the estimated emissions associated with Phase 1 of the Proposed Action.

Table 4.6-1. Estimated Air Emissions Associated with Phase 1 Construction Activities

Time Frame	*VOCs*	*CO*	*NO_x*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Total Emissions (FY18-FY20)	2.56	14.27	23.96	0.29	1.44	1.40
Annual	0.9	4.8	8.0	0.1	0.5	0.5
Applicable Threshold	[1]100	250	[1]100	250	250	250
Threshold Exceedance?	No	No	No	No	No	No

Note: [1]The General Conformity Threshold for VOCs and NO_x is 100 tons per year.

As indicated in the table above, the Phase 1 annual emissions would be below applicable thresholds.

4.6.2.2 Phase 2

Phase 2 construction activities slated to occur at Lewisville Dam include building a fine horizontal filter around the existing dam outlet conduit and adding an upstream embankment berm. In addition to onsite construction equipment, other mobile sources include delivery trucks bearing construction materials and concrete trucks. These material deliveries were conservatively estimated to originate from the Dallas area, with a roundtrip distance of 80 miles. Table 4.6-2 lists the estimated emissions associated with Phase 2 of the Proposed Action.

Table 4.6-2. Estimated Air Emissions Associated with Phase 2 Construction Activities

Time Frame	*VOCs*	*CO*	*NO_x*	[2]*SO_2*	*PM_{10}*	*$PM_{2.5}$*
Total Emissions (FY22-FY25)	0.43	2.80	3.77	0.04	0.24	0.24
Annual	0.1	0.7	0.9	0.0	0.1	0.1
Applicable Threshold	[1]100	250	[1]100	250	250	250
Threshold Exceedance?	No	No	No	No	No	No

Note: [1]The General Conformity Threshold for VOCs and NO_x is 100 tons per year.

As indicated in the table above, Phase 2 annual emissions would be below applicable thresholds.

4.6.2.3 Cumulative Impacts

The Proposed Action would result in less than significant impacts to air quality. Many large-scale transportation, planning, and recreation enhancement projects would likely occur within the ROI between existing conditions and the year 2070, resulting in impacts to regional air quality. Transportation-related cumulative projects in the region would result in a beneficial long-term impact to air quality by improving regional transportation and thus reducing trip times and associated emissions, despite an initial adverse impact resulting from construction-related emissions. The Proposed Action is a localized project and the projected emissions are unlikely to substantially contribute to the cumulative air quality condition of the AQCR; the cumulative condition would not differ substantially from that described for the FWPC (Section 4.6.3). Therefore, the Proposed Action, in conjunction with cumulative projects, would result in less than significant impacts to air quality.

4.6.2.4 Summary

Implementation of the Proposed Action would result in temporary increases in criteria pollutant emissions associated with construction activities; however, the emissions would not exceed *de minimis* thresholds. No long-term increase in mobile or stationary source emissions in the ROI would occur. Therefore, implementation of the Proposed Action would result in less than significant impacts to air quality.

4.6.3 Future without Project Condition

As with the Proposed Action cumulative condition, many large-scale transportation, planning, and recreation enhancement projects would likely occur within the ROI between existing conditions and the year 2070, resulting in impacts to regional air quality. Many of the future projects would require the use of heavy construction equipment and vehicles, which would result in a temporary increase in mobile source emissions (most notably VOCs and NO_x, $PM_{2.5}$, and PM_{10}) to the region. The proposed future construction projects could require a conformity applicability analysis and demonstration of compliance with the Texas SIP, for up to 20 years after attainment for ozone is achieved.

Following construction, an overall reduction in mobile source emissions would be expected to occur as the majority of the FWPC projects are designed to improve traffic and circulation, promote pedestrian and bicycle use, and enhance recreational opportunities, all of which could result in a reduction in vehicle trips and lengths and beneficial impacts to air quality. None of the identified future projects would result in significant new sources of stationary emissions.

Under the FWPC, the TCEQ would continue to implement the strategies outlined in the April 2016 Dallas-Fort Worth International Airport (DFW) Area Redesignation Substitute SIP Revision for the one-hour and 1997 eight-Hour Ozone NAAQS and the 2015 Proposed DFW 2008 Eight-Hour Ozone Nonattainment Area Attainment Demonstration Sip Revision for the 2017 Attainment Year (TCEQ 2015). With implementation of these strategies, technologically driven reductions in vehicle and equipment emissions, a promotion of mass transit, and implementation of the reasonably foreseeable projects that enhance recreational opportunities and improve traffic and circulation, air quality within the AQCR over the next several decades would likely improve. Specifically, the overall trend of a reduction in NO_x emissions would likely continue and VOC emissions would likely stabilize if not decrease. Therefore, there would likely be a reduction in mobile emissions and beneficial impacts to air quality within the AQCR under the FWPC.

4.7 CULTURAL RESOURCES

The evaluation of impacts focuses on the protection of historic properties that are eligible for listing in or are listed in the NRHP. Suggestions for actions to avoid and/or minimize impacts to potential cultural resources are included in Chapter 5.

4.7.1 Proposed Action

4.7.1.1 Borrow Pits

Under the Proposed Action, two borrow pits located south of Lewisville Dam would provide fill material for construction activities. Archaeological pedestrian survey and trenching has occurred at both locations (Peter et al. 2016). Neither pedestrian survey nor trenching recovered archaeological materials. Therefore the use of borrow pits would not result in significant impacts to historic properties under the Proposed Action. If buried cultural resources are encountered during borrow pit excavation, digging would halt, and the finds would be reported to the supervisor on site who would in turn notify the USACE Project Manager.

4.7.1.2 PFM 2

Under the Proposed Action, a fine horizontal filter and two outlets on each side of an existing conduit would be constructed. Any construction associated with PFM 2 would occur within the footprint of the dam. The original construction of the dam eliminated the probability of archaeological resources within the dam footprint. The Lewisville Dam has been recommended not eligible for listing in the NRHP under Criteria A and C. The THC has concurred that the dam is not eligible under Criterion C but concurrence under Criterion A is still pending. Actions associated with PFM 2 would therefore not result in significant impacts to historic properties under the Proposed Action.

4.7.1.3 PFM 4A

<u>Downstream Inverted Filter Berm</u>

Under the Proposed Action, a downstream inverted filter berm would be constructed at Seepage Area 1 located along the western toe of the Lewisville Dam. Soil to construct the berm would be gathered from the borrow sites. The Lewisville Dam is not eligible for listing in the NRHP (pending coordination with the THC). There are no historic properties located in the construction zone for the downstream inverted filter berm.

<u>Collection Trench</u>

Under the Proposed Action, an approximately 400 feet. long collection trench would be constructed in a disturbed area along the western toe of the Lewisville Dam and along the inverted filter berm. The Lewisville Dam has been recommended not eligible for listing in the NRHP under Criteria A and C. The THC has concurred that the dam is not eligible under Criterion C but concurrence under Criterion A is still pending. There are no historic properties located where the collection trench would be constructed. Actions associated with PFM 4A would therefore not result in significant impacts to historic properties under the Proposed Action.

4.7.1.4 PFM 4B

<u>Downstream Inverted Filter Berm</u>

Under the Proposed Action, a berm would be constructed along the length of a collection trench that would extend downstream into existing, developed lands. The developed lands have been in use since

1990 and will not be eligible for listing on the NRHP until they reach 50 years of age. A parabolic drainage ditch would be included downstream of the toe of the berm. The material that would be used to create this berm would come from the borrow pits. No historic properties are located within the footprint of the proposed downstream inverted filter berm.

Collection Trench

Under the Proposed Action, the collection trench would be approximately 1,200 feet long and would be located in the existing drainage ditch just south of the toe road. Lands surrounding the area are heavily modified, evident from existing trenching. If buried cultural resources are encountered, digging should halt and the finds should be reported to the supervisor on site who would in turn notify the USACE Project Manager. There are no historic properties located where the collection trench would be constructed. Actions associated with PFM 4B would therefore not result in significant impacts to historic properties under the Proposed Action.

4.7.1.5 PFM 6

Geomembrane Blanket

Under the Proposed Action, a geomembrane blanket would be installed in the approach channel of the spillway. The removed material would come from ground that has already been disturbed from the initial building of the Dam. The Lewisville Dam has been recommended not eligible for listing in the NRHP under Criteria A and C. The THC has concurred that the dam is not eligible under Criterion C but concurrence under Criterion A is still pending.

Post-tensioned Anchors

Under the Proposed Action, post-tensioned anchors would be used to stabilize the existing monoliths. The Lewisville Dam has been recommended not eligible for listing in the NRHP under Criteria A and C. The THC has concurred that the dam is not eligible under Criterion C but concurrence under Criterion A is still pending. Actions associated with PFM 6 would therefore not result in significant impacts to historic properties under the Proposed Action.

4.7.1.6 PFM 7

Under the Proposed Action, apron slabs would be installed over the existing apron slabs on the spillway. The Lewisville Dam has been recommended not eligible for listing in the NRHP under Criteria A and C. The THC has concurred that the dam is not eligible under Criterion C but concurrence under Criterion A is still pending. Actions associated with PFM 7 would therefore not result in significant impacts to historic properties under the Proposed Action.

4.7.1.7 PFM 8

Under the Proposed Action, an embankment berm would be constructed upstream on parts of the existing embankment. The fill used for the embankment berm would come from the proposed borrow locations. Additionally, parts of the crest would be modified and would include removal of existing pavement and removal of approximately 6 feet of the embankment. A geomembrane would be added prior to repaving the crest road. The Lewisville Dam has been recommended not eligible for listing in the NRHP under Criteria A and C. The THC has concurred that the dam is not eligible under Criterion C but concurrence under Criterion A is still pending. Actions associated with PFM 8 would therefore not result in significant impacts to historic properties under the Proposed Action.

4.7.1.8 Project Features Required for All PFMs

No archaeological remains were discovered within the action area; therefore, the use of the staging areas and borrow pits would not result in significant impacts to historic properties under the Proposed Action.

4.7.1.9 Cumulative Impacts

No projects aside from the Proposed Action are being implemented or are being proposed within the Project Area, and therefore the cumulative context of the Proposed Action impacts to cultural resources is the same as described above. No significant cumulative impacts would occur.

4.7.1.10 Summary

No impacts to historic properties would occur with the implementation of the Proposed Action. Cultural resource investigations of the borrow sites have been completed as part of this analysis, and no new sites have been identified. Therefore, implementation of the Proposed Action would not result in any impacts to historic properties.

4.7.2 Future without Project Condition

Under the FWPC, historic properties would be unaffected. Any archeological properties directly south of the dam would most likely remain undisturbed due to their location in an area not likely subject to development as it is owned by the USACE.

Through time, increased temporal perspective could result in a reevaluation of the dam as a historic resource within a larger historic context as those contexts are expanded and the role of the dam within the context of the larger North Texas Trinity River watershed is more fully understood. Essentially unchanged since its original construction in the 1950s, the dam as a resource would retain its integrity of location, setting, design, materials, workmanship, feeling and association if it is not changed other than receiving routine operations and maintenance. Therefore, no significant impacts to historic properties would occur.

4.8 UTILITIES

4.8.1 Approach to Analysis

The following designations were used to evaluate the level of project impacts:

- *Potentially significant impact*: Significant adverse impacts to utilities would occur if implementation of any of the proposed projects would result in the use of a substantial proportion of the remaining utility system capacity, reach or exceed the current capacity of the utility system, or require development of facilities and utility sources beyond those existing or currently planned.
- *Less than significant impact*: There would be no significant or unmitigable impacts on the utility system from the implementation of a proposed project (e.g., relocation of utilities).
- *Beneficial impact*: Beneficial impacts to utilities would occur if a proposed project results in increases in utility capacity or a reduction in potential flood extent.
- *No impact*: The project would have no impact to utilities.

4.8.2 Proposed Action

4.8.2.1 Construction

Construction associated with the proposed treatments at PFM 4A involving Seepage Area 1 would require relocation of two City of Lewisville water supply lines (i.e., PFM 10) prior to construction in order to accommodate an approximately 400-foot long trench. The proposed re-establishment of a 50-foot "vegetation clear zone" along the toe of the embankment would include realignment of utilities within this clear zone. During relocation of the water supply lines, there would likely be short-term, pre-approved, scheduled, and controlled utility service interruptions; however, upon completion of construction these temporary service interruptions would cease.

Any utilities pipelines that may be present within the vicinity of the Seepage Area 2 for PFM 4B treatment would be located in advance and the approximately 1,200-foot long trench would be designed and constructed to avoid them. All underground utility locations would be marked at the surface at the construction site and a 50-foot buffer zone would be maintained between construction activities and the underground utilities.

Embankment stability construction associated with PFM 8 that includes removal of approximately 6 feet of embankment, would be designed and constructed to avoid water supply lines operated by North Texas Municipal Water District, the City of Lewisville, and the Upper Trinity Regional Water District. As described above, all underground utility locations would be marked at the surface at the construction site and a 50-foot buffer zone would be maintained between construction activities and the underground utilities.

The two water wells identified near Seepage Area 1 and the proposed Borrow Site A (as depicted in the May 2011 and 2014 EDR well search reports; see Figure 3.8-1, *EDR Corridor Map with Well Locations*) would be avoided during the design phase and a 50-foot buffer zone would be mapped around them to ensure no damage occurs during construction and excavation of fill material.

Additional conclusions as a result of the 2011 and 2014 EDR studies include: (1) the Ritter Cemetery and debris disposal area found along the northern side of proposed Borrow Site B would also be avoided during the design phase and a 50-foot buffer zone would mapped around them so they are not disturbed during construction and excavation of fill material; and (2) existing piezometers, observation wells, and relief wells within Seepage Areas 1 and 2 would be protected or plugged prior to and during placement of fill material.

An overhead electrical line passes over the construction areas for PFM 2, PFM 4A, and PFM 4B. Contractors would be required to coordinate with the overhead utilities to ensure there would be no contact with heavy machinery or equipment.

The proposed borrow sites are undeveloped, open land without facilities or known aboveground or underground utilities. Therefore, no impacts to facilities or utilities are anticipated with removal of materials from the proposed borrow sites.

4.8.2.2 Operations

Post construction, seepage flow under the dam would be expected to cease, and conduit and embankment strengthened with the addition of collection trenches, filter berms, stabilization material and rock riprap protection. Increased operating efficiency of the facilities and utilities would likely result following completion of the project.

4.8.2.3 Cumulative Impacts

No projects aside from the Proposed Action are being implemented or are being proposed within the Project Area, and therefore the cumulative context of the Proposed Action impacts to utilities is the same as described above. Utility demand would increase with the predicted increase in population in the region. It can be reasonably anticipated that area utility providers would plan and implement additional utility upgrade/improvement projects to increase capacity to meet the anticipated increase in utility demands associated with future population growth. No significant impacts to utilities would occur.

4.8.2.4 Summary

Implementation of proposed construction activities under the Proposed Action could result in temporary and localized impacts to utility services. These impacts would be communicated to customers ahead of the temporary outage. The USACE project team has been meeting frequently with utilities to discuss any utility relocation that would be required, as well as to identify construction efficiencies that could occur. Therefore, implementation of the Proposed Action would result in less than significant impacts to utilities.

4.8.3 Future without Project Condition

Under the FWPC, the Lewisville Dam facilities would continue to require maintenance and repair. There would continue to be risks of internal erosion and piping from high seepage volumes along the outlet conduit as well as risks of sliding and breach of the weir and internal erosion of the foundation. The top of the dam would be at risk of lowering due to the instability of the upstream embankment slope and continued concerns regarding the stability of the embankment toe that is prone to enlargement at the unfiltered pipe exit due to existing seepage pressure.

FWPC projects in response to the regional population growth would result in improvements to overall utility service, as well as incorporate water conservation and water reuse strategies, thereby resulting in a likely increased efficiency of water use and beneficial impacts to water supply. Water planning strategies include water conservation, contract for return flows, and additional direct reuse. The existing water line encroachments to the Lewisville Dam would be relocated, thus eliminating a potential erosion route that could otherwise compromise embankment stability.

The majority of the FWPC projects would likely result in the temporary or permanent relocation of utilities which would also require temporary operation adjustments of the dam facilities, particularly where the City of Lewisville water lines are located. During construction, there would likely be short-term, pre-approved, scheduled, and controlled utility service and dam facility interruptions; however, upon completion of construction these temporary service interruptions would cease. Therefore, no significant impacts to utilities would occur under the FWPC.

4.9 RECREATION

4.9.1 Approach to Analysis

In order to provide an overall framework for evaluating recreational resources within the Project Area, recreational opportunities were identified within the adjacent communities as well as the surrounding municipalities that use Lewisville Lake for recreational purposes. From there, impacts associated with the Proposed Action were considered in the context of the recreational landscape as a whole to determine the intensity of impact from any potential disruptions of recreational amenities.

4.9.2 Proposed Action

4.9.2.1 Construction

Construction activities associated with the PFMs would not be expected to directly affect recreational areas. Public access to recreational areas of the Lewisville Lake as well as trails, parks, all other recreational amenities within the Project Area would be maintained. Construction vehicles accessing and leaving the site(s) would use the main access roads. To avoid interruption to public access to recreational areas and resources, a temporary access road would be in place prior to construction. The road would run parallel to the existing main access roads.

There would be no lake lowering required under the Proposed Action and thus no impacts to lake use would occur. Fishing activities that occur downstream of the conduit may be interrupted during the construction phase for PFM 2 but impacts would be temporary and short-term.

Construction vehicle access to and collection of material from the borrow pits would be staged to minimize disruption of LLELA's normal daily operations.

On-going coordination would occur with all municipalities, utilities, and stakeholders (including LLELA) regarding details of construction (schedule) and alternate public access roads during the construction process. Therefore, no significant construction impacts to recreational resources would occur with implementation of the Proposed Action.

4.9.2.2 Operations

Daily operations of Lewisville Dam would not change the current conditions of recreational resources or future growth of resources in the area. Beneficial impacts to recreational resources would result through increased stability of the dam reducing potential flood impacts that have closed parks and limited use of Lewisville Lake for recreational purposes in the past. Therefore, no significant operation impacts to recreational resources would occur with implementation of the Proposed Action.

4.9.2.3 Cumulative Impacts

No projects aside from the Proposed Action are being implemented or are being proposed within the Project Area, and therefore the cumulative context of the Proposed Action impacts to recreational resources is the same as described above. The Proposed Action would occur on USACE lands operated by LLELA. LLELA would continue to manage the Project Area consistent with their current mandate of education and restoration. No significant cumulative impacts to recreational resources would occur with implementation of the Proposed Action.

4.9.2.4 Summary

Proposed construction activities would result in temporary disruptions to recreational activities within the Project Area. However, access to LLELA would be maintained, and educational facilities would be unaffected. Recreational fishing activities at the outfall would be temporarily disrupted during construction. The USACE has been coordinating potential construction and equipment routes with LLELA to ensure access is maintained throughout the project implementation period. Therefore, implementation of the Proposed Action would result in less than significant impacts to recreation.

4.9.3 Future without Project Condition

Under the FWPC, recreational resources are expected to expand in the Project Area downstream of the Lewisville Dam (City of Lewisville 2016). LLELA recently expanded operations to seven days per week for hiking, fishing, camping, canoeing, and other outdoor activities and is expecting to continue expansion of the size of their current program (City of Lewisville 2016). There are plans to increase from 40 to 80 campsites and adding one new trail that is longer than the current five trails (City of Lewisville 2012).

Across the rest of Lewisville Lake, many municipalities that operate parks are rehabilitating the facilities and enhancing the recreation programs. Lewisville, Highland Village, Hickory Creek, The Colony, Little Elm, and Lake Dallas have made significant improvements in their respective lease areas (City of Highland Village 2008; City of The Colony 2015). Therefore, no significant impacts to recreation would occur under the FWPC.

4.10 TRANSPORTATION

4.10.1 Approach to Analysis

A qualitative assessment of the Proposed Action was completed to consider impacts on peak hour commutes, queues, and delays in and around the ROI. The potential concentration of project-related trips during peak hours was considered.

4.10.2 Proposed Action

4.10.2.1 Environmental Consequences

Under the Proposed Action, remediation measures would be implemented to mitigate the PFMs and improve the safety of the Lewisville Dam. Construction equipment and workers would travel along regionally significant arterials and surface streets within and surrounding the ROI to arrive to the work sites along the Lewisville Dam.

Construction is proposed to occur between FY 2018 to FY 2025, and be divided into two phases: Phase 1 is proposed to occur between FY 2018 and FY 2020, and Phase 2 between FY 2022 and FY 2025. Project-related trips would include construction worker commuting trips and truck trips for the delivery of construction related equipment and materials. These trips may contribute incrementally to existing and projected future queues and delays on ROI roadways. However, the traffic increase would be temporary and, where possible, construction travel to the site would be scheduled to occur outside of the peak commuting hours. Therefore, the contribution to peak hour congestion is expected to be relatively minor. As project-related trips along the roadways in the ROI would be sporadic throughout the construction period and involve only an incremental increase to existing traffic volumes during off-peak hours, the Proposed Action would not significantly impact recreational access to Lewisville Lake or LLELA (see Section 4.8, *Recreation*, for more information).

Borrow Site A would be used first for the embankment improvements that are proposed, and material would be taken from Borrow Site B only after Borrow Site A has been used to capacity. Construction vehicles transporting material from the borrow sites will use exiting access roads on LLELA, and would not use external streets in the ROI. In rare circumstances, borrow material may need to be transported on the local street network. In the instances where this would occur, the number of vehicles would be minor compared to the existing traffic, and the trips would be short in duration. The collection of material would be staged to avoid interruption of LLELA's normal daily operations. Therefore, construction related to the PFMs would have a less than significant impact on transportation.

4.10.2.2 Cumulative Impacts

The regional transportation projects are not anticipated to interact with the Proposed Action, due to the distance from Lewisville Lake and the availability of alternate local route options near the ROI. Additionally, LLELA would continue to control access to the area directly south of the Lewisville Dam, so an influx of new users is not anticipated, as LLELA facilities and programs are not slated for expansion. Therefore, there would be no cumulative impacts with respect to transportation.

4.10.2.3 Summary

Implementation of the Proposed Action would increase the amount of construction-related traffic (e.g., workers and equipment deliveries) within the ROI. Because the borrow pits are located within LLELA, the majority of fill material haul trips to and from the construction sites are expected to be confined to LLELA, and would not traverse the street network. However, it may be necessary in some instances to transport fill material via public streets. With the implementation of the SCMs identified in Chapter 5, the Proposed Action would result in less than significant impacts to transportation. Therefore, no significant impacts to transportation would occur under the FWPC.

4.10.3 Future without Project Condition

NCTCOG's *Mobility 2040* plan analyzes long-term transportation needs projected to the year 2040. The 2040 projections were used for the analysis related to transportation, even though the majority of this EA uses the year 2070 to analyze the FWPC. Under the FWPC, the Proposed Action would not be constructed and material from the borrow sites would not be used. No additional traffic associated with construction would be added to the ROI (e.g., worker commutes and construction equipment/material deliveries), and traffic conditions would be similar to those projected by NCTCOG. Regional and local transportation planning projects and recreation enhancement projects would likely occur within ROI between the current conditions and the year 2040. Many of the projects would use construction equipment and associated vehicles, resulting in regional transportation impacts.

NCTCOG uses population forecasts for the 12-county metropolitan planning area to develop their transportation plans. *Mobility 2040* projects that the population in Denton County, where the City of Lewisville is located, will grow by 54% between 2017 and 2040. This growth rate is higher than the projected growth for the entire metropolitan planning area, at 48% (NCTCOG 2016). Coinciding with the forecasted population growth, NCTCOG projects that, in a no-build scenario, congestion/delay in the Lewisville Lake area will be characterized as moderate to severe in and around the ROI. With implementation of the large-scale multimodal transportation projects outlined in *Mobility 2040*, congestion/delay is anticipated to be light to moderate in the ROI (NCTCOG 2016). Therefore, no significant impacts to transportation would occur under the FWPC.

4.11 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.11.1 Approach to Analysis

Socioeconomic impacts are assessed in terms of direct effects on the local economy and population, and related indirect effects on other socioeconomic resources within the ROI. Socioeconomic impacts would be considered significant if the Proposed Action resulted in a substantial shift in population trends or notably affected regional employment, earnings, or community resources such as schools.

Environmental justice impacts are assessed in terms of direct effects on overburdened populations (i.e., minorities, Indian Tribes, low-income residents, and children) within the project ROI. Environmental justice impacts would be considered significant if impacts related to the various resource sections analyzed would result in a disproportionate impact to these identified populations.

4.11.2 Proposed Action

4.11.2.1 Construction

Construction activities would be expected to directly affect the local economy through a temporary increase in economic activity in the construction sector. Temporary increases in employment, income, business activity, and local tax revenues would be anticipated. No permanent change in population or demand on local public services would be expected.

No negative impacts associated with reduced recreation activity would be expected as public access to recreational areas of the Lewisville Lake as well as trails, parks, and all other recreational amenities within the Project Area would be maintained.

Construction activities would not disproportionately affect the health or environment of minority or low-income populations.

4.11.2.2 Operations

Daily operations of Lewisville Dam would not change the current socioeconomic conditions, future economic growth, or population change. There would be potential economic benefits associated with increased stability of the dam reducing potential flood impacts on private and public facilities.

Operations would not disproportionately affect the health or environment of minority or low-income populations.

4.11.2.3 Cumulative Impacts

The past, present, and reasonably foreseeable population growth in the region has spurred growth in supporting infrastructure. This growth continues to contribute to a cumulatively beneficial impact to local and regional economic conditions. The projects would help fuel and sustain the local and regional economy by creating jobs, business revenue, personal income, and fueling indirect and induced effects in various industries. Therefore, there would be beneficial cumulative impacts with respect to socioeconomics.

4.11.2.4 Summary

Implementation of the Proposed Action would create temporary construction jobs for the duration of the project. The Proposed Action is not anticipated to disproportionately or adversely impact minorities, children, or the economically disadvantaged. Therefore, implementation of the Proposed Action would result in minor, beneficial impacts to socioeconomic conditions.

4.11.3 Future without Project Condition

Under the FWPC population growth would likely generate further economic expansion and housing development in the area. Population projections from the Texas Water Plan for years 2020 through 2070 are shown in Table 4.11-1 along with year 2010 population data published by the U.S. Census Bureau.

Table 4.11-1. Population Projections for Watershed Counties

County	2010	2020	2030	2040	2050	2060	2070
Collin	782,341	956,716	1,116,830	1,363,229	1,646,663	1,853,878	2,053,638
Cooke	38,437	42,033	45,121	48,079	53,532	64,047	96,463
Denton	662,614	901,645	1,135,397	1,348,271	1,576,424	1,846,314	2,090,485
Grayson	120,877	134,785	148,056	164,524	185,564	250,872	344,127
Montague	19,719	20,507	21,260	21,600	21,979	22,223	22,401
Wise	59,127	79,882	94,734	110,668	149,261	188,770	227,527
Total	**1,683,115**	**2,135,568**	**2,561,398**	**3,056,371**	**3,633,423**	**4,226,104**	**4,834,641**

4.12 CLIMATE

4.12.1 Potential Impact of the Proposed Action on Climate

The Proposed Action, which would involve relatively small-scale construction and renovation projects occurring over a range of years, would primarily generate GHG emissions as a result of construction equipment operations and other mobile source activities. There are no apparent carbon sequestration impacts that would result from implementation of the Proposed Action. Thus, the total direct and indirect impacts would be constrained to very small increases in GHG emissions to the atmosphere as a result of construction and repair activities. These small increases would be far below the 25,000 metric ton per year threshold for discussion of GHG emission impacts (CEQ 2014). The GHG estimates for Phase 1 and Phase 2 of the Proposed Action are provided in Appendix E.

In conclusion, the Proposed Action, which involves repair and construction activities over the near-term 2018-2020 for Phase 1 and 2020-2025 for Phase 2 would incrementally contribute to global emissions for a limited period of time, but are not themselves of such magnitude as to make a direct correlation with climate change.

4.12.2 Potential Impact of Climate Change on the Proposed Action

4.12.2.1 Predicted Temperature Changes

The USGCRP looks to two potential future conditions as part of its predictive modeling process. Under conditions of lower greenhouse gas emissions, the average temperature in the Great Plains region may increase as much as 4°F by 2020, 6°F by 2050, and 8°F by 2090 from averages observed in 2000. Under conditions of higher continuous greenhouse gas emissions, the potential increase is greater in the long-term, and may be as much as 13.5°F by 2090. Projected changes in long-term climate predict more frequent extreme events such as heat waves, droughts, and heavy rainfall (USGCRP 2014). These varying conditions shape the resource-level discussion presented here.

4.12.2.2 Extreme Weather Events

Despite the documented increase in precipitation since 1991, current simulations predict decreasing rainfall for the region into the future. As climate change continues to influence weather patterns, current modeling predicts that the average spring rainfall in the Dallas area may decrease between 5% (low emissions scenario) and 15% (high emissions scenario) by 2070-2090. At the same time, the precipitation that does fall is predicted to occur in more frequent heavy rainfall events, and thus the intensity of flooding is projected to increase. The increase in frequency of extreme heat events is also likely to continue; the temperatures observed during extreme events are projected to increase by 4°F to 15°F, depending on the emissions scenario used for predictive modeling (USGCRP 2014). This change in precipitation and heat would likely alter agricultural and ecosystem conditions.

This combined increase in extreme heat and extreme rainfall has the potential to adversely impact the embankment. Prolonged, extreme heat has the potential to increase cracking and desiccation of the embankment, which could make it more prone to slumps and slides when rainfall does come. Rain coming in more concentrated, extreme events puts increased pressure on the embankment; the embankment would be at risk of slides from high intensity and volume rain, and would be under physical pressure from the lake being at flood stage at the same time. The USACE would continue to employ careful monitoring of the embankment stability throughout the year, and especially during rain events to ensure the safety of those depending on the embankment for flood risk reduction.

The combined increased risk of drought and flooding may indicate a decrease in overall water quality. Increased frequency and duration of droughts, and associated low water levels, increase nutrient concentrations and residence times in streams, have the potential to increase the likelihood of harmful algal blooms and low oxygen conditions.

4.12.2.3 Predicted Habitat Changes

As climate change is seen in increased temperatures and drier conditions in the Dallas area, aquatic, open water, and emergent wetland habitats are expected to convert to drier habitats, such as bottomland hardwoods and grasslands (USFWS 2016a). By the year 2070, emergent wetlands are expected to convert to grassland due to siltation and drier conditions from climate change; aquatic riverine habitat is expected to be converted to riparian hardwoods, primarily due to warmer and drier conditions from climate change; and substantial portions of remaining riparian woodlands would become drier upland forests (USFWS 2016a). Meanwhile, grassland and plains birds could experience significant shifts and reductions in their ranges (USGCRP 2014).

As temperatures increase optimal zones for growing crops will shift. Pests that were historically unable to survive in cooler areas may spread northward. Milder winters and earlier springs also may encourage greater numbers of pest species. Rising carbon dioxide levels in the atmosphere may increase growth of both crop and weeds species. In some areas, water scarcity may reduce or even eliminate certain types of agricultural production. Similarly, changes in temperature and precipitation affect the composition and diversity of native animals and plants through altering their breeding patterns, water and food supply, and habitat availability. In a changing climate, populations of some pests such as red fire ants and rodents, better adapted to a warmer climate, are projected to increase (USGCRP 2014).

4.12.2.4 Predicted Changes to Energy Demands and Emissions

Changes in temperature are also correlated with changes in energy demands. Energy demands for the region associated with heating needs are expected to decrease by between 27% (low emissions scenario) and 40% (high emissions scenario) by 2080-2099. However, the predicted temperature change anticipates more warm days, and therefore increased cooling demands. In the region, energy demands associated with cooling needs are expected to increase by between 28% (low emissions scenario), and 73% (high emissions scenario) by 2080-2099. At the same time, power sources may become less dependable. The portion of U.S. electric grid disturbances caused by weather-related phenomena has more than tripled from about 20% in the early 1990s to about 65% in recent years. The frequency of disturbance caused by extreme weather has increased tenfold since 1992 (USGCRP 2014).

The potential for increased risk of power loss, combined with increased temperatures has the potential to have substantial impacts on public health. Heat is the leading cause of weather-related deaths in the U.S. More than 3,400 deaths between 1999 and 2003 were reported as resulting from exposure to excessive heat. Analyses suggest that currently rare extreme heat waves will become much more common in the future. At the same time, the U.S. population is aging, and older people are more vulnerable to hot weather and heat waves. Diabetics are also at greater risk of heat-related death, and the prevalence of obesity and diabetes is increasing (USGCRP 2014).

In an effort to help minimize potential adverse impacts from climate change, the City of Dallas has a series of programs designed to minimize GHGs and favor more sustainable lifestyle choices. In 2006, the Mayor of Dallas signed the U.S. Mayors Climate Change Agreement, which is a commitment by the mayors around the country to reduce GHG emissions in their own cities and communities to 7% below 1990 levels by the year 2012 through improved efficiency in government fleets, improved transit systems, and other emissions reduction measures (Green Dallas 2008).

In 2010, the estimated GHG emissions from the City of Dallas operations were 402,560 metric tons (Green Dallas 2012). This amount is approximately 33% less than 1990 GHG emissions (Green Dallas 2012). The City of Dallas has already attained the 7% GHG emissions reduction for the period between 1990 and 2012. The main factors that may have helped Dallas obtain this goal are (1) the purchase of renewable energy sources (at 40%) for the City's electricity consumption, and (2) the energy efficiency improvements in the power generation sector (Green Dallas 2012).

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CHAPTER 5
SPECIAL CONSERVATION MEASURES

Implementation of the Proposed Action would require that construction contractors prepare a SWPPP, Environmental Protection Plan (EPP), and a Contingency Action Plan (CAP) for approval by the USACE before construction begins. These plans incorporate SCMs designed to prevent and/or minimize adverse impacts to resources. SCMs may be resource specific, or may be procedural and apply to several different resources. In addition, mitigation measures may also be applied to counter impact that cannot be sufficiently avoided or minimized by an SCM. The SWPPP primarily addresses surface water quality and erosions control. The CAP would include protocols in the event of unexpected conditions (e.g., discovery of hazardous materials) as well as emergency response conditions in the event of flooding in the Project Area. The EPP addresses cross-resource avoidance and minimization measures. Specifications associated with each of these plans are available through the USACE Fort Worth District contracting office.

Planning efforts for USACE projects ensure that project-related adverse environmental impacts (i.e., impacts on fish and wildlife resources) have been avoided or minimized to the extent practicable, and that remaining unavoidable significant adverse impacts are compensated to the extent justified.

The following is a list of SCMs that would be implemented as part of the Proposed Action. The measures recommended here are based on current design; it is possible that as the designs of measures are refined, these measures are no longer appropriate and there are better approaches that may reduce environmental impact.

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
	Planning and Design	
PD-1	This EA and associated reports included in the appendices of this EA evaluated preliminary design plans. Further design should refine the current plans, and not significantly alter size, alignment, or the magnitude of potential impacts. If there are substantial changes between the preliminary design and future designs, additional analysis may be required for NEPA and regulatory compliance. This analysis may include the potential for additional public and agency review and comment. This SCM is applicable to all resource areas and environmental justice.	N/A
PD-2	For each construction proposal, SWPPP will be prepared by the construction contractor. The SWPPP would include site-specific BMPs to minimize erosion, sediment generation, and fugitive dust generation during construction.	SWPPP
PD-3	The design and construction of proposed retaining walls, embankment fills, cut slopes, and levees would have appropriate temporary and permanent erosion and/or scour control measures to minimize erosion potential and levee/channel slope instability.	SWPPP
PD-4	For each construction proposal, the construction contractor will prepare a CAP for managing hazardous materials on the construction site that reflects the guidance of Army Regulation 200-1 and ER 1165- 2-132 before implementing the Proposed Action. If a contractor suspects that soils are contaminated, the CAP would provide protocol for testing of soils prior to excavation and movement to/from the borrow sites.	CAP

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
PD-5	For each construction proposal, the construction contractor will prepare an EPP that will include site- and resource-specific SCMs to avoid and/or minimize environmental impact during and after construction.	EPP
PD-6	The project will be required to limit the establishment and harmful effects of non-native/invasive species within the areas of ecosystem restoration/habitat enhancement. Measures included will conform to the requirements of the USACE Operations Natural Resources and Regional Planning and Environmental Center, and will include at minimum the following components: a. A list of the non-native/invasive plant and animal species that may occur, along with practical methods for their detection and removal. b. Monitoring protocols and provisions to ensure that non-native invasive plant and animal species are detected early and eradicated if possible, but in any case controlled to ensure that they do not become dominant to the exclusion of native species.	EPP
PD-7	For each construction proposal, the construction contractor will prepare a Traffic Control Plan for managing traffic during construction. The Traffic Control Plan would also establish travel routes from freeways to construction sites. To the extent feasible, the travel routes will use multilane arterials and will avoid traversing residential areas. Also, to the extent feasible, the Traffic Control Plan will shift truck trips to periods outside the peak commuting hours (typically 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. on weekdays). Construction scheduling will consider phasing to minimize vehicle trips. The Traffic Control Plan will be incorporated into the SWPPP. This SCM is also applicable to environmental justice.	SWPPP
PD-8	If construction takes place after truck restrictions are implemented on IH-30 and IH-35E, the contractor will coordinate with TxDOT and NCTCOG to either process a temporary waiver to accommodate the delivery of fill material to area landfills, or to identify alternative routes that avoid the routing of dump trucks to surface streets. This coordination would be documented in the Traffic Control Plan in the SWPPP. This SCM is also applicable to environmental justice.	SWPPP
	Pre-Construction Phase	
PRE-1	The perimeter of all areas to be disturbed during construction activities will be clearly demarcated using flagging or temporary construction fencing, and no disturbance outside the demarcated perimeter would be authorized. All access routes into and out of the proposed disturbance area will be flagged, and no construction travel outside those boundaries will be authorized. When available, areas already disturbed by past activities or those that would be used later in the construction period would be used for staging, parking, and equipment storage. This SCM is also applicable to environmental justice.	SWPPP, CAP, EPP
PRE-2	Staging areas will be established for the storage of equipment and materials. Construction equipment will be stored within a staging area at the end of each working day to minimize trip generation to and from the site. The removal of any trees or potential ground nesting areas will comply with the MBTA. BMPs will also be implemented to prevent soil erosion at the staging areas. This SCM is also applicable to environmental justice.	SWPPP, CAP, EPP

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
PRE-3	For each distinct project element, a Field Contact Representative will be present during the beginning of the construction period to provide all construction personnel with an environmental education briefing that would include, but not be limited to, the following: • information regarding sensitive species and habitats with the potential to occur in the area, • impacts that may occur, • conservation measures being implemented, • construction worker responsibilities under the ESA, and • avoidance and reporting procedures.	SWPPP, CAP, EPP
PRE-4	In defining the construction extents for each element, the construction contractor will minimize the amount of disturbed ground area at any given time.	SWPPP, EPP
PRE-5	Erosion control measures and appropriate BMPs, as required and developed through the SWPPP, would be implemented before, during, and after construction activities in accordance with the Texas Construction General Permit TXR150000.	SWPPP
PRE-6	Truck operators will certify their understanding and compliance with the Truck Traffic Management Plan prepared per PD-8 before they can participate in construction activities.	SWPPP
PRE-7	The construction contractor will be required to survey for all pre-existing utilities in the area to avoid and/or minimize any temporary interruption of utility service(s).	CAP
PRE-8	Prior to construction, project designers/engineers would be required to coordinate with Digsafe and all local utility providers to obtain a comprehensive list of all underground and overhead utilities in the Project Area. Utility providers would be required to visit all work sites and mark the locations and purpose/contents of their respective underground lines at the ground surface, including such utilities as long-distance communications, oil and natural gas transmission pipelines. Project designers and engineers would work with the marked utility locations to design dam improvements to avoid the marked utilities and leave a 50-foot buffer construction around them. Utility locations would be clearly marked on all scale construction plans provided to contractors. Project engineering staff would designate personnel to visit the work sites on a weekly basis to inspect the surface utility markings, ensure they are visible and intact and that the onsite construction personnel understand their purpose, and conduct all work outside the 50-foot buffer zone.	CAP
PRE-9	If proposed construction activities occur during the avian breeding season (February 15 through August 31), construction activities will comply with the MBTA to avoid impacts to nesting migratory birds within the region of influence. Specifically, a biologist will check the proposed construction sites, including laydown areas, for nests (in trees, shrubs, and on the ground) before the construction phase has begun. If the biologist finds an active nest, construction workers would not directly or indirectly disturb the nest or adjacent areas until the biologist determines the nest is no longer active. Specific avoidance measures to be implemented would be determined at the time of the surveys.	EPP

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
Construction Phase		
C-1	Prior to entry into the construction site, all equipment will be cleaned to prevent the import of non-native plant species. Also before entering the construction site, all equipment would be inspected to ensure that hydraulic fittings are tight, hydraulic hoses are in good condition, and to verify that there are no leaks of petroleum, oils, or lubricants. Any vehicle or piece of equipment found to have a leak or potential for leak would not be used until repair has been completed and the vehicle or equipment has been tested in a contained and bermed area to ensure that no leaks would occur. Equipment vehicle maintenance would be in accordance with manufacturer's specifications.	SWPPP, CAP, EPP
C-2	Vehicle and equipment fueling and maintenance, as well as storage of any fluids would take place only in level, designated staging areas at least 500 feet from wetlands, surface water bodies, and seasonal drainages, and in locations that would not interfere with emergency vehicle access to the dam, construction work sites, and the on-site fuel station.	SWPPP, CAP, EPP
C-3	BMPs will be implemented at staging areas to prevent the discharge of petroleum, oils, lubricants and other pollutants to the municipal storm drain system and/or adjoining land.	SWPPP, EPP, CAP
C-4	On-site fueling activities, including transport of portable fuel tanks to and from the work site, would be carried out by personnel trained in field fueling procedures and spill response, control, and cleanup.	SWPPP, CAP
C-5	If established, the on-site fuel station and equipment would be inspected daily for leaks and structural integrity, and a written record would be kept that includes the date and time of inspection, name of inspector, components inspected and their condition, and weather and temperature at time of inspection. If a leak is found, or a faulty component is noted, the project manager would be notified immediately and on-site refueling will cease until conditions are corrected. Absorbent pads and berms would be applied at the leak location/structural defect. The Lewisville Fire Department and TCEQ would be notified.	SWPPP, CAP
C-6	Prior to excavating fill from the borrow sites, contractor will remove and retain topsoil for re-surfacing at project completion.	SWPPP, EPP
C-7	Use mulches, blankets or matting, sod, or erosion control compost to aid in control of erosion on steep slopes, swales, diversion dikes, and on stream banks. As soon as practicable, seed or rip-rap slopes that would be permanent.	SWPPP
C-8	Use the most appropriate structure for intercepting and detaining small amounts of sediment-laden runoff from relatively small, unprotected areas. Examples include: silt fencing; detention basins; mulch, compost, sand bag, stone or brush filter berms or socks; and hay bale dikes.	SWPPP
C-9	All open storage piles and disturbed areas will be stabilized by covering and/or applying water or chemical/organic dust palliative where appropriate at active and inactive sites during workdays, weekends, holidays, and windy conditions.	SWPPP
C-10	Wind fencing will be installed at active construction sites. During windy conditions, grading operations will be phased as appropriate to minimize dust. Water trucks for dust stabilization of surfaces under windy conditions may be used.	SWPPP
C-11	When hauling excavated or fill material and operating non-earthmoving equipment, operators will prevent spillage and limit speeds to 15 miles per hour for non-earthmoving equipment and 10 miles per hour for earth-moving equipment.	SWPPP

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
C-12	As determined in the Traffic Control Plan prepared per PD-7, contractors will be responsible for providing and maintaining all barricades, warning signs, flashing lights and traffic control devices in conformance with Part VI of the Texas Manual on Uniform Traffic Control Devices (TxDOT 2012). Closure of traffic lanes and sidewalks along any public roadway will be restricted to the hours of 8:30 a.m. to 3:30 p.m. workdays to minimize the impact on traffic flows, unless otherwise approved by the USACE. This SCM is also applicable to environmental justice.	SWPPP
C-13	To minimize the potential for starting a fire, all smoking will be restricted to areas clear of vegetation and all vehicles would be equipped with spark arrestors and fire extinguishers.	CAP, EPP
C-14	If any potential contamination is encountered, work in the area would cease and the material would be tested in accordance with the CAP. The soil samples would be screened for potentially hazardous contaminant concentrations that may exceed the protective conservation level for human health exposures to surface soils through the combined ingestion of soils and vegetation, inhalation, and dermal contact pathways as defined in the Texas Risk Reduction Program Tier I Residential Protective Concentration Level standards.	CAP
C-15	Solid waste receptacles will be maintained at construction staging areas, and nonhazardous solid waste (trash and waste construction materials) will be collected and deposited in on-site receptacles. Waste receptacle will be secured containers to prevent birds or other scavengers from being attracted to the site.	CAP, EPP
C-16	During construction, with respect to the handling, storage, and/or disposal of hazardous and/or regulated materials, contractors will operate in accordance with USACE Safety and Health Requirements Manual 385-1-1: Safety and Health; Army Regulation 200-1: Environmental Protection and Enhancement; and the approved CAP prepared per PD-4.	CAP
C-17	To minimize potential impacts of exposure to or release of hazardous and regulated materials, all fuels, waste oils, and solvents will be collected and stored in tanks or drums within a secondary containment system that consists of an impervious floor and bermed sidewalls capable of containing the volume of the largest container, plus 10%, stored therein.	CAP
C-18	Equipment with hydraulic systems would have a vapor barrier under the equipment at all times. A berm would be built around the vapor barrier to prevent fluid release.	CAP
C-19	If established, the on-site fuel station would include absorbent materials, berms, and empty containers to limit and control possible accidental releases of fuel. The on-site fuel station would be located on a level paved surface, at least 500 feet from drainages and surface water bodies. If there is no pavement at the work site, the fuel station would be placed on high-density polyethylene sheeting.	CAP
C-20	If established, the on-site fueling station would be fenced and locked to prevent access by unauthorized persons when project personnel are not present. The fence would be posted with signs stating "Authorized Personnel Only."	CAP
C-21	When the project is completed, the temporary on-site fueling station would be removed from the Project Area. Any remaining usable fuel, hydraulic fluid, coolants, and lubricants would be re-used elsewhere. All hazardous materials and containers would be removed from the Project Area and properly recycled/disposed per federal, state, and county regulations	CAP

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
C-22	The construction contractor will closely monitor weather reports throughout the Upper Trinity River watershed. If significant rain events are predicted within the watershed, the contractor would coordinate with the Lewisville Lake Office and determine if evacuation is recommended. Construction will not occur during rain events, and construction personnel will have frequent communication with the Lewisville Lake Office to assess the safety of operating within LLELA.	CAP
C-23	Create native grasslands, where possible, throughout the Project Area to replace Bermuda grass and Johnsongrass. a. Recommend planting native grass and forb species appropriate for the soils. b. Plant shrub and tree mottes in savannas, and maintain them to no more than about 10% canopy cover	EPP
C-24	All deep, narrow open pits that pose a threat to wildlife will be covered at the end of each construction day so animals do not become trapped.	EPP
C-25	Any construction equipment that comes in contact with lake or riverine waters will adopt the “Clean, Drain, and Dry” protocol to prevent zebra mussel larvae from spreading among Texas waters. This protocol requires thoroughly cleaning, draining, and drying boats and equipment after each and every put-in.	EPP
C-26	If human remains and/or objects subject to the Native American Graves Protection and Repatriation Act (25 USC §§ 3001 *et seq*.) or the Texas Health and Safety Code Chapter 711-715, are encountered during proposed construction activities, work would immediately stop, and the contractor would immediately notify the USACE and THC, and consult with appropriate federally recognized Tribe(s) to determine appropriate treatment measures in agreement with 36 CFR Part 800.13. If then determined necessary, a cultural resources monitor would be present during additional construction in the discovery area.	EPP
C-27	Construction will comply with Section 4(b) of the Noise Control Act of 1972 (42 USC Sections 4901-4918), which directs federal agencies to comply with applicable federal, state, and local noise requirements with respect to the control and abatement of environmental noise. This SCM is also applicable to environmental justice.	EPP
C-28	Operators will limit idling of heavy equipment to less than five minutes and verify idling limits through unscheduled inspections.	EPP
C-29	Construction contractors will maintain and tune engines per manufacturer's specifications to perform at USEPA certification levels, prevent tampering, and verify maintenance with unscheduled inspections to ensure these measures are followed.	EPP
C-30	If practicable, contractors will use new, clean equipment meeting the most stringent of applicable federal or state standards. Contractors will commit to the best available emissions control technology. Tier 4 engines should be used for project construction equipment to the maximum extent feasible. Lacking availability of non-road construction equipment that meets Tier 4 engine standards, the construction contractor will commit to using USEPA-verified particulate traps, oxidation catalysts and other appropriate controls where suitable to reduce emissions of diesel particulate matter and other pollutants at the construction site; and consider alternative fuels and energy sources such as natural gas and electricity (plug-in or battery).	EPP
C-31	When selecting trees for the Habitat Measures project element, consider planting mast producing trees and shrubs in the borrow sites where they are lacking to improve the canopy cover and food base.	EPP

Table 5-1. Special Conservation Measures to be Incorporated into Proposed Action Implementation

Number	*Description*	*Plan*
	Post-Construction and Operations Phase	
POST-1	During operations, spill response materials (e.g., absorbents, drain covers, mops, brooms, shovels, drum repair materials and tools, warning signs and tapes, and personal protective equipment) will be readily available for use and during transport in the event of an accidental release.	SWPPP, CAP, EPP
POST-2	All disturbed soils will be immediately stabilized following the completion of work and be replanted with native species. Noxious and invasive vegetation would be controlled by hand weeding or herbicide application.	SWPPP, EPP
POST-3	All construction equipment and/or activities that produce waste oil and solvents would be recycled. All non-recyclable hazardous and regulated wastes would be collected, characterized, labeled, stored, transported, and disposed of in accordance with all applicable federal, state, and local regulations, including proper waste manifesting procedures.	CAP
POST-4	A Health and Safety Plan identifying potential safety hazards and providing procedures to mitigate for these would be developed and procedures reviewed with all cleanup personnel prior to post-flood response/clean-up activities.	CAP
POST-5	Borrow sites should be graded to minimize the alteration of local hydrology and contoured to connect to existing surrounding contours to hasten the re-establishment of vegetation following project completion.	EPP
POST-6	Provide brush and log piles in existing habitats where they are lacking to provide cover for small mammals.	EPP
POST-7	Any mowing schedule that may be developed should promote tall grass growth, but not interfere with tall-grass nesting birds.	EPP
POST-8	Once construction is complete, the contractor will restore all items not specifically included in street reconstruction that are disturbed during installation of temporary traffic control, to original or better condition. This SCM is also applicable to environmental justice.	EPP
	Mitigation and Monitoring Measures*	
M-1	Erosion, fugitive dust, and sedimentation controls identified in the SWPPP would be monitored and maintained during construction and for 12 months thereafter to ensure site stabilization.	SWPPP
M-2	The construction contractor will designate personnel to monitor dust control and to increase dust suppression measures (e.g., watering exposed soils), as necessary, to minimize the generation of dust.	SWPPP
M-3	The USACE and LLELA will develop and implement a Habitat Measures Monitoring Plan. Overall performance standards for the measures will be established through this plan.	EPP
M-4	The USACE and LLELA will implement the habitat measures using species as identified in the 2016 PAR (Appendix C), and adaptively managed thereafter. In particular, the PAR identifies the use of regionally native plants and landscaping practices that attract and support a diverse and robust pollinator community.	EPP
M-5	Proper advanced notification of potential disruption to recreation areas will be provided to the public. This mitigation is also applicable to environmental justice.	EPP

Note: * No mitigation is required to comply with the CWA, NRHP, or ESA. Mitigation recommended includes public notice and dust control at the construction site. Monitoring is recommended as part of the implementation of the habitat measures project element, as well as to determine when dust suppression is needed.

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CHAPTER 6
OTHER CONSIDERATIONS REQUIRED BY NEPA

6.1 UNAVOIDABLE ADVERSE IMPACTS AND CONSIDERATIONS THAT OFFSET THESE IMPACTS

Avoidance and minimization of adverse impacts to natural, cultural, and other environmental resources were integrated into the Proposed Action to the greatest extent possible and practicable. However, adverse impacts may not always be completely avoided and/or minimized. SCMs have been developed over the course of impact analysis. These measures are identified in Chapter 5, *Special Conservation Measures.* As the NEPA process progresses, additional mitigation measures and management actions may be revised based on consultation with federal and state regulatory agencies and comments received from the public. The EA will be updated to reflect these changes, including additional and revised SCMs, as applicable.

6.2 RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA requires an analysis of the relationship between a project’s short-term impacts on the environment and the effects that these impacts may have on the maintenance and enhancement of the long-term productivity of the affected environment. Impacts that narrow the range of beneficial uses of the environment are of particular concern. This refers to the possibility that choosing one development option reduces future flexibility in pursuing other options, or that giving over a parcel of land or other resource to a certain use often eliminates the possibility of other uses being performed at that site. Under the Proposed Action, short-term effects would be primarily related to construction activities and the use of associated vehicles and equipment that could be used for other purposes. In the long-term, the proposed construction would provide an important reduction in risk. With implementation of BMPs and SCMs, the Proposed Action would not result in any impacts that would reduce environmental productivity or narrow the range of beneficial uses of the environment.

6.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Resources that are irreversibly or irretrievably committed to a project are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel. These resources are irretrievable in that they would be used for a project when they could have been used for other purposes. Human labor is also considered an irretrievable resource. In addition, the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment is also considered an irreversible commitment of resources. Implementation of the Proposed Action would require the consumption of materials typically associated with construction activities (e.g., concrete). In addition, the use of vehicles and construction equipment would result in the consumption of fuel, oil, and lubricants. An undetermined amount of human energy for construction would also be expended and irreversibly lost. However, the amount of these resources used would be relatively minor and these resources are readily available in large quantities. Therefore, implementation of the Proposed Action would not result in significant irreversible or irretrievable commitment of resources.

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CHAPTER 8
PERSONS AND AGENCIES CONTACTED

USFWS

Sean Edwards
Biologist – Conservation Planning Assistance

THC

Mark Wolf
Executive Director

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CHAPTER 9
LIST OF PREPARERS

Under the direction of the USACE Fort Worth District, the following Cardno and subcontractor staff prepared this EA:

Project Management

Ryan Pingree, Project Director, 21 years' experience
M.S., Environmental Science and Management

Erica Boulanger, Project Manager, 12 years' experience
B.S., Environmental Science

Quality Assurance

Melanie Hernandez, Technical Review, 18 years' experience
J.D., Environmental Law

Lisa Woeber, Technical Review, 19 years' experience
B.B.A., Business Administration

Technical Analysts

Scott Barker, Transportation, 26 years' experience
M.S., Civil Engineering/City Planning

Erica Boulanger, Climate Change, 12 years' experience
B.S., Environmental Science

Scott Coombs, Water Resources, 404(b)(1) Analysis, 17 years' experience
M.S., Marine Science

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B.A., Chemistry

Mike Dungan, Senior Analyst; Biological Resources, 34 years' experience
Ph.D., Ecology and Evolutionary Biology

Caitlin Jafolla, Technical Editing, Transportation Analysis, 4 years' experience
B.A., Urban Studies and Planning

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Jackie Clark, Graphic Design, 7 years' experience
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B.A., Geography

Document Production

Claudia Tan, Production Manager, Technical Editor, 14 years' experience
A.A., Liberal Arts and Sciences

Appendix A

Public Notification and Correspondence

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We estimate the annualized cost to the CPSC of $1,028,794 by adding the four categories of work related to the Database summarized in Tables 4 through 7 (Reports of Harm ($843,226.96) + MII Claims ($150,505.00) + Manufacturer Comments ($18,793.06) + Small Batch Identification ($16,269.12) = $1,028,794.14).

This information collection renewal request based on an estimated 19,845 burden hours per year for the Database is a decrease of 17,284 hours since this collection of information was last approved by OMB in 2011. The decrease in burden is due primarily to the fact that the number of responses estimated in our original request overstated the number of actual responses submitted; we thus lowered the estimated number of responses based on actual experience since the original request.

D. Request for Comments

The Commission solicits written comments from all interested persons about the proposed collection of information. The Commission specifically solicits information relevant to the following topics:

- Whether the collection of information described above is necessary for the proper performance of the Commission's functions, particularly with respect to the Database, including whether the information would have practical utility;
- Whether the estimated burden of the proposed collection of information is accurate;
- Whether the quality, utility, and clarity of the information to be collected could be enhanced; and
- Whether the burden imposed by the collection of information could be minimized by use of automated, electronic, or other technological collection techniques, or other forms of information technology.

Dated: August 12, 2013.

Todd A. Stevenson,

Secretary, Consumer Product Safety Commission.

[FR Doc. 2013–19858 Filed 8–14–13; 8:45 am]

BILLING CODE 6355–01–P

CORPORATION FOR NATIONAL AND COMMUNITY SERVICE

Information Collection; Submission for OMB Review, Comment Request

AGENCY: Corporation for National and Community Service.

ACTION: Notice.

SUMMARY: The Corporation for National and Community Service (CNCS) has submitted a public information collection request (ICR) entitled Peer Reviewer Application Instructions for review and approval in accordance with the Paperwork Reduction Act of 1995, Public Law 104–13, (44 U.S.C. Chapter 35). Copies of this ICR, with applicable supporting documentation, may be obtained by calling the Corporation for National and Community Service, Vielka Garibaldi, at (202) 606–6886 or email to *vgaribaldi@cns.gov.* Individuals who use a telecommunications device for the deaf (TTY–TDD) may call 1–800–833–3722 between 8:00 a.m. and 8:00 p.m. Eastern Time, Monday through Friday.

ADDRESSES: Comments may be submitted, identified by the title of the information collection activity, to the Office of Information and Regulatory Affairs, Attn: Ms. Sharon Mar, OMB Desk Officer for the Corporation for National and Community Service, by any of the following two methods within 30 days from the date of publication in the **Federal Register**:

(1) *By fax to:* (202) 395–6974, Attention: Ms. Sharon Mar, OMB Desk Officer for the Corporation for National and Community Service; or

(2) *By email to: smar@omb.eop.gov.*

SUPPLEMENTARY INFORMATION: The OMB is particularly interested in comments which:

- Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of CNCS, including whether the information will have practical utility;
- Evaluate the accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;
- Propose ways to enhance the quality, utility, and clarity of the information to be collected; and
- Propose ways to minimize the burden of the collection of information on those who are to respond, including through the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology.

Comments

A 60-day notice requesting public comment was published in the **Federal Register** on May 30, 2013. This comment period ended July 30, 2013. CNCS received no responsive comments to the 60-day notice.

Description: CNCS seeks to renew the current information collection. Minor revisions are proposed to clarify eGrants instructions and reflect adjustments to the Corporation for National and Community Service eGrants system. The information collection will otherwise be used in the same manner as the existing application. CNCS also seeks to continue using the current application until the revised application is approved by OMB. The current application is due to expire on September 30, 2013.

Type of Review: Renewal.

Agency: Corporation for National and Community Service.

Title: Peer Reviewer Application Instructions.

OMB Number: 3045–0090.

Agency Number: None.

Affected Public: Individuals who are interested in serving as peer reviewers and peer review panel coordinators for CNCS.

Total Respondents: 2,000.

Frequency: One time to complete.

Average Time Per Response: Averages 40 minutes.

Estimated Total Burden Hours: 1,333 hours.

Total Burden Cost (capital/startup): None.

Total Burden Cost (operating/maintenance): None.

Dated: August 8, 2013.

Vielka Garibaldi,

Director, Office of Grants Policy and Operations.

[FR Doc. 2013–19792 Filed 8–14–13; 8:45 am]

BILLING CODE 6050–28–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement for Dam Safety Study, Lake Lewisville Dam, Elm Fork Trinity River, Denton County, Texas

AGENCY: Department of the Army, U. S. Army Corps of Engineers, DoD.

ACTION: Notice of intent.

SUMMARY: Authorized by the River and Harbor Act of March 2, 1945, Lake Lewisville embankment construction began in December 1948 with completion in August 1955. The project includes an earthen embankment that is approximately 32,000 feet in length and has a maximum height of 125 feet at elevation 560 feet (all elevations are NGVD) with gated outlet works and an uncontrolled concrete ogee weir spillway. The primary purposes of the project are flood risk management,

water supply, recreation and non-Federal hydropower. Top of conservation pool was originally set at elevation 515.

Following construction of Ray Roberts Dam upstream, the conservation pool of Lewisville was raised from elevation 515 to 522 on November 30, 1988. At elevation 522, the lake inundates approximately 29,600 surface acres. Top of flood pool is elevation 532 which inundates approximately 39,200 surface acres. Downstream of the dam, approximately 2,000 acres of Corps of Engineers (Corps) owned lands are currently leased by the Lewisville Lake Environmental Learning Area. A former fish hatchery is also operated by the government for national research on controlling nuisance aquatic plants.

The risk associated with the Lake Lewisville project was first evaluated in 2005 after the Corps instituted a Screening Portfolio Risk Assessment (SPRA) program to assess the risk of all 694 dams in the Corps' portfolio. The SPRA report completed in July 2005, was reviewed by Corps senior dam safety officials who concluded that the risks associated with the possible poor performance of the dam were above the Corps' tolerable risk guidelines. As a result, additional studies of the project were initiated. These studies are currently ongoing, and will evaluate appropriate ways to minimize risk associated with the project. While the Corps completes in-depth studies of the project to determine appropriate permanent methods for correcting potential problems, interim risk reduction measures have been implemented. In anticipation of possible permanent corrective actions at the project, and in order to fully comply with National Environmental Policy Act (NEPA) requirements, the Corps is preparing a project report and a Draft Environmental Impact Statement (DEIS) to identify the environmental impacts associated with any alternatives to repair and reduce risks at the Lake Lewisville Dam. The general study area will be the Lake Lewisville proper and floodplain from Ray Roberts Dam downstream to Interstate Highway 20 in Dallas County.

DATES: A public scoping meeting will be held on August 20, 2013 beginning at 7:00 p.m.

ADDRESSES: The meeting will be held at the Medical Center of Lewisville—Grand Theater Black Box Theater Room, 100 North Charles Street, Lewisville, TX 75057.

FOR FURTHER INFORMATION CONTACT: Questions pertaining to the proposed action and DEIS can be addressed to: Ms. Hollie Hunter, Environmental Project Manager, CESWF–PER–EE, U.S. Army Corps of Engineers, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102–0300, (817) 886–1849.

SUPPLEMENTARY INFORMATION: The study area lies within an area of rapid growth in the Lewisville, Grapevine, Dallas, Texas corridor along the Elm Fork and Mainstem floodways of the Trinity River.

Alternatives will be developed and evaluated based on ongoing research and data collection and past studies conducted by the Corps. Preliminary alternatives considered will include dam modifications necessary to reduce risk to acceptable levels, and will include consideration of any required hydraulic, environmental or recreational mitigation.

The public will be invited to participate in the scoping process, invited to attend public meetings, and given the opportunity to review the DEIS. The first public scoping meeting will be on (see **DATES** and **ADDRESSES**). Subsequent public meetings, if deemed necessary, will be announced in the local news media. Release of the DEIS for public comment is scheduled for September 2014. The exact release date, once established, will be announced through mailings to known interested individuals, agencies and officials and in the local news media.

Future coordination with other agencies and public scoping will be conducted to ensure full and open participation and aid in the development of the DEIS. All affected Federal, state, and local agencies, affected Indian tribes, and other interested private organizations and parties are hereby invited to participate. Continued coordination will also be conducted with the U. S. Fish and Wildlife Service (USFWS). The USFWS will furnish information on threatened and endangered species in accordance with the Endangered Species Act. In addition, the USFWS will also be requested to provide support with planning aid and to provide a Fish and Wildlife Coordination Act Report. The State Historic Preservation Office will be consulted as required by Section 106 of the National Historic Preservation Act.

Dated: August 7, 2013.

Eric W. Verwers,

Chief, Planning, Environmental, and Regulatory Division.

[FR Doc. 2013–19813 Filed 8–14–13; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Intent To Grant a Partially Exclusive License; Ridgetop Group, Inc.

AGENCY: Department of the Navy, DoD.

ACTION: Notice.

SUMMARY: The Department of the Navy hereby gives notice of its intent to grant to Ridgetop Group, Inc. located at 3580 West Ina Road, Tucson, AZ 85741, a revocable, nonassignable, partially exclusive license in the United States to practice for all fields of use the Government-Owned invention described in U.S. Patent No. 7,626,398: System for Isolating Faults Between Electrical Equipment, Navy Case Number 97027, inventors Quiter et al., issued December 01, 2009.

DATES: Anyone wishing to object to the grant of this license must file written objections along with supporting evidence, if any, not later than August 30, 2013.

ADDRESSES: Written objections are to be filed with the Naval Air Warfare Center Aircraft Division, Technology Transfer Office, Attention Gaetan Mangano, Code 4.0, Highway 547, Building 150–3, Lakehurst, NJ 08733.

FOR FURTHER INFORMATION CONTACT: Dan Swanson, 406–994–7736, *dss@montana.edu,* TechLink, 2310 University Way, Building 2–2, Bozeman, MT 59715. TechLink is an authorized Department of Defense Partnership Intermediary.

Authority: 35 U.S.C. 207, 37 CFR Part 404.

Dated: August 7, 2013.

C.K. Chiappetta,

Lieutenant Commander, Office of the Judge Advocate General, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. 2013–19803 Filed 8–14–13; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF ENERGY

Revision of a Currently Approved Information Collection for the Energy Efficiency and Conservation Block Grant Program Status Report

AGENCY: U.S. Department of Energy.

ACTION: Notice and request for comments.

SUMMARY: A 60-day notice and request for comments was published in the **Federal Register** on July 6, 2013 (78 FR 34089). No comments were received in response to this Notice.

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF:

August 14, 2013

Planning, Environmental, and Regulatory Division

The Honorable Michael C. Burgess, M.D.
Lewisville District Office
1660 South Stemmons Freeway, Suite 230
Lewisville, TX 75067

Dear Representative:

This letter is to notify you that the U.S. Army Corps of Engineers (USACE) Fort Worth District, intends to prepare an Environmental Impact Statement (EIS) for the Dam Safety Modification Study at Lewisville Dam. The Dam Safety Modification Study is being conducted in response to the screening and classification performed in 2005 which identified this project as very high risk because of confirmed and unconfirmed potential safety issues, as well as potential impacts of those issues on the large downstream populations which may be affected. As a result, further analysis and evaluation to confirm safety issues and assess the actual level of risk of those issues are ongoing. While these studies and analyses are being conducted, interim risk reduction measures have been implemented to reduce potential dam safety risks. These interim measures include the installation of filters and monitoring devices, stockpiling materials for use in emergency situations, and increased surveillance of the dam during high flood pool levels. Please see the enclosed USACE Dam Safety Facts for Lewisville Lake Dam for additional information.

The EIS will analyze the potential direct, indirect, and cumulative environmental consequences resulting from the implementation of the project's action alternatives.

Our office is soliciting any input you may have to address concerns regarding the proposed study to assist us as we progress through the National Environmental Policy Act (NEPA) process. Additionally, we would like to invite you to a public scoping meeting addressing the initiation of the environmental and economic analysis associated with the Dam Safety Modification Study. Scoping extends throughout the development of the EIS; however, verbal and written comments received during the meeting and written comments received during the first 30 days after the scoping meetings are more readily useful to the process. The public scoping meeting will occur from 7:00 p.m. to 8:30 p.m. with doors opening at 6:30 p.m. on August 20, 2013, and will be held at the following location:

Medical Center of Lewisville – Grand Theater
Black Box Theater Room
100 North Charles Street
Lewisville, Texas 75057

We look forward to receiving your comments as we move forward. If you are unable to attend the public meeting you may provide scoping comments directly to Ms. Hollie Hunter, ATTN: CESWF-PER-E, P.O. Box 17300, Fort Worth, Texas 76102-0300 or hollie.hunter@usace.army.mil. Thank you for your interest and cooperation.

Sincerely,

E. W. Verwers

Eric W. Verwers
Chief, Planning, Environmental, and
Regulatory Division

Enclosure

Lake Lewisville Dam - Public Scoping Meeting

August 20, 2013

MERIT COURT REPORTERS LLC
CERTIFIED SHORTHAND REPORTERS

Job No. 17184

307 W. 7th Street, Suite 1350
Fort Worth, Texas 76102

817-336-3042 * depos@merittexas.com

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FORT WORTH DISTRICT
ARMY CORP OF ENGINEERS
LEWISVILLE LAKE ENVIRONMENTAL IMPACT STATEMENT
SCOPING MEETING
PUBLIC FORUM
AUGUST 20TH, 2013
Grand Theater
100 North Charles Street
Lewisville, Texas 75067

Reported by Vicki L. Smith

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MS. FAGERHOLM: Ladies and gentlemen, this concludes our formal presentation. At this time, I invite you to come up to the microphone over here or please raise your hand and a microphone will be brought over to you.

I would ask that you limit your questions or comments to one per person and no more than three minutes. Questions and comments should be related to the study or the EIS, and, again, we are at the very beginning of this process so we are limited in specific details.

Please state your name for the record before proceeding with your comment. Our transcriber, Ms. Vicki Smith, over here may also ask for clarification on your name or comment for the record after you have completed your comment.

If you do not have the opportunity to come up in person, please drop your comment in the comment box outside or submit them by e-mail to Ms. Hollie Hunter using the contact information on the screen.

Our presenters and Corp staff will remain available to take a few questions or comments one on one after the meeting. Our public affairs team will also assist media wishing to conduct interviews with the Corp

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subject matter experts.

Thank you again for your participation.

Would you like a microphone, sir?

MR. PETTY: I would like to ask a question.

MS. FAGERHOLM: Sure.

MR. PETTY: My name is Mel Petty.

MS. FAGERHOLM: Let's get the microphone, please.

MR. PETTY: And I've -- hello, my name is Mel Petty, and I've been here a long time. I had the opportunity of working on this project back in 1951. And I was told when it filled up, I think, in '56, when it reached pool level, that we had leaks at that time. Does this meeting indicate that the leaks have gotten worse?

MS. FAGERHOLM: Anita, would you like to handle this?

MS. BRANCH: No. Oh, yeah, I'll handle it. Yes, I'll handle it. And no -- no, the leaks haven't gotten worse. But -- but you are correct. Basically, once -- once there was water back behind that dam.

Water knows better than we do, because we only go through and we drill a couple little spaces,

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actually hundreds of little spaces, to know what's down there. But we can't possibly know every type of material that's down there.

And so water -- water is going to find out where we -- where we didn't discover something that would have been helpful to us in the design. So you're absolutely right. As soon as the pool got up, we started getting seepage.

And, so, as a result, we've had to go in over time, and we've -- we've done other things to actually help us control that. We've put in relief wells, and we've put in a system of drains. It hasn't -- it hasn't stopped it. It hasn't impacted the quantity, and, basically, we're kind of seeing that the quantity is staying the same.

But, again, the consequences are what's driving this. We're worried that if we don't do something we could end up having issues later. One of the things that we've got going for us is that the seepage that's coming through that you saw shortly after the construction was finished is that it's clear.

And if it's clear, that means that it's only water coming through and it's not moving soil particles. So there's not a whole lot of energy out there that actually is moving that soil out that really

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gives us a grave amount of concern, so.

MR. PETTY: I have one more question, please. Given in e early 60s or whenever they raised the pool level up to seven foot, 515 to 522, they raised the boat ramps up, also. I was wondering if there's any consideration of lowering low water boat ramps? Is that in the plan at anytime or are they in the process of closing some of them right now?

MS. BRANCH: I don't know the answer to that. Do we have someone here that can answer that?

MS. FAGERHOLM: Yes, we have lake personnel available in the Ranger uniforms. It -- he's waving his hand in the dark over there. So if you'd like to talk to him, his name is Justin Berndt, afterwards. I'm sure he can help you out.

I see a hand go up in the back.

MS. WOOD: Hi, my name is Sharon Wood. I'm a teacher at Marcus High School. My question is, along with the seepage and some of the other problems that -- the issues that you're looking at in the dam, how much of a concern is the buildup of the sediment on the lakeside as we get, you know, floods coming in and dropping off sediment up against the dam?

Because one of the things I've read is that that can -- that can be a problem for the dam. So

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I was wondering if that's also a contributing factor into some of the issues that you're having with the dam?

MS. BRANCH: Actually, the sediment would -- would in all probability actually reduce the issues associated with the seepage, because those are very, very fine grain materials and it's much, much harder for water to move through that. So -- so we do have some sedimentation occurring.

We have -- we go out and periodically do surveys, and we show that in some areas we've got close to four, five feet of sediment that's actually come in. But, again, no, we don't think that has been a concern for us with respect to the problems for the performance of the dam itself.

MR. DAVIS: Hi, Jim Davis, Lewisville. Could you touch again on the pool level you discussed earlier, not letting the level rise during flood season? And what level the flood -- floodplain is today? I think you mentioned if there was a lot of water you would not go above the current pool level.

MS. BRANCH: No, I -- if I said that, I'm so sorry, because that would not have been the intent. You know, this dam is here for -- for flood risk management.

What I was trying to say, and I'll try

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and clarify it a little bit better here, is that if we need to as the pool rises and we get into flood conditions, if we need to, I think before we were authorized to discharge at 4,000 cubic feet a second to help us handle that flood water loading that comes in.

So because we do have these concerns, one of the things we wanted to do is if we need to, as the flood water is coming up, we want to be able to get it out behind the dam as quickly as possible. Again, if we need to.

If we see signs of distress, you know, when that pool water comes up, we're actually out there inspecting it several times a day, so we're watching the dam. So we did get -- we have permission to actually go in and increase those discharges from 4,000 to 5,000 CFS, and because of that, we'll be able to get water from out -- out from behind the dam quicker. But, no, we don't have any plans to restrict any pools at all whatsoever.

MR. DAVIS: Okay. Another question, today is -- today is there any kind of early warning system for downstream?

MS. BRANCH: Jason, can I ask you to help me with that question? This is Jason Vazquez, and he is the Dam Safety Program Manager for the Fort Worth

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District Army Corp of Engineers. And he's got 25 dams that he's responsible for, so he can address that one.

MR. VAZQUEZ: That's a great question. Actually, one of the interim risk reduction measures was to study the potential for a downstream notification system. What we found out is a lot of the downstream cities are already -- they have standing systems in place.

So right now what we're working with instead of trying to reinvent the wheel and have our own alert system, we're working with the downstream agencies to tie into theirs, and that way make efficient use of their systems in place but get them the information they'll need to make actions during a flood situation.

MS. BRANCH: Thank you, Jason.

MS. WOOD: I think he might need to come up here again, because my questions all go towards that. I am interested in whether or not we had an emergency action plan in place seeing the risk that we're under with the high population and stuff. But I went and pulled some fact sheets, and as of 2008, we had 23 dams in Texas that failed.

Of those, how many were in a high populated area, and were there -- were they on your list? Did you have all these interim measures in place

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for any of them? I mean, you say we shouldn't be worried, but 2008 to March of 2012, 23 failed.

MR. VAZQUEZ: Okay. I'm going to try to do my best with this. First thing to understand is the Corp of Engineers owns and operates about 25 dams in the Fort Worth District, and those are the dams that we are concerned with.

And those are not the dams that were listed in the study that you provided. None of our dams have failed ever that -- so that -- that's the answer to that question is, the 25 dams that we were responsible for, that's not part of that study.

To answer your question on the emergency action plans, yes, we do currently have an active emergency action plan. All specific information to the downstream resource or downstream agencies, emergency management agencies, and available resources for flood fighting are updated annually.

And as part of the risk management process that the Corp is doing now, emergency exercises have been instituted, and the frequency of those exercises is raised for the -- based on risk.

So with Lewisville, we will be having some kind of coordination with downstream stakeholders. We're going to try to do that annually, and we will have

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some kind of exercise every two years. And we did our first one last year in actually September 11th of 2012, almost exactly a year ago.

And we had more than 19 downstream cities participate in that, and that was a great exercise to get this information to the downstream agencies and let them know what was -- what the potential consequences are with our structure.

So we are implementing that coordination as part of our interim risk reduction measure, because that is -- actually, it's what we like to refer to as low hanging fruit, because that's easy stuff that we can do right away. It's not that hard to coordinate with people, so we -- we've really increased our coordination.

MS. WOOD: Okay. On the facts for Lewisville Lake dam that y'all put out on the City's website, it talked about as far as getting flood insurance, those of us that may be in the path of this should something happen. Where can we find a map that we don't have to guesstimate where our house is if that has the dam failure inundation area on it so we know where we sit in that particular area?

MR. VAZQUEZ: That is a very good question. There's actually a lot of talk about that

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information right now, and a lot of policy makers are having kind of up-and-down decision weighing the pros and cons of releasing that information readily to everyone, because it could show our vulnerabilities.

The best I can tell you right now is, if you contact the Corp directly and you tell us where your property is and what your need for this information is, we can get you that information for your property on a direct request basis. And other than that, limited information will be made available to the downstream agencies that could be shared with the public.

Like I said, I'm going to have to leave it at that right now, because there's a lot of policy makers trying to decide what information is able to be released and what information is not.

MS. WOOD: Well, I understand politics, but I need to know who to call, because I would like to know where my house sits. So if I need to call somebody directly, what number is that?

MR. VAZQUEZ: You contact the public affairs office, and they can direct that inquiry to the proper person and get you that information.

MS. HUNTER: And if you want to e-mail me, I can point you in the right direction, too.

MS. WOOD: Okay.

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(Discussion off microphone.)

MS. FAGERHOLM: Do we have any more questions or comments?

MS. MENARD: Hi, my name is Karen Menard. I work for the Upper Trinity Regional Water District in Lewisville, and we are a major stakeholder from a water supply standpoint. Your map that you showed earlier, you talked about the City of Denton and the City of Lewisville.

We actually supply the water to that -- to the City of Lewisville as well as 25 other cities in this area. I wanted to mention we currently have a 60-inch water supply line that goes from the intake at the dam to our water plant.

Part of our plans for future growth include two parallel 84-inch lines to get us from 70 million gallons a day to 300 million gallons a day. So the intake structure on the dam is not the ultimate facility, and plans are in place for additional future growth.

The District respectfully requests that its needs be considered as a stand-alone entity since it is ultimately responsible for the water needs of several cities in the surrounding area.

We also request that cumulative impacts

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be considered as they relate to future maintenance and projects such as fiberoptics. And any kind of water quality impacts that may effect the water quality in the lake would be things such a turbidity, that kind of thing, please consider that, as well. That's all I have.

MS. FAGERHOLM: Okay. Your comments have been noted for the record, and we will be following up with our water partners as the need arises. Thank you very much.

MR. BACCHUS: Yes, ma'am. My name is Steve Bacchus. I'm with the City of Lewisville, and to complement the young lady from Upper Trinity, we also have basically an intake structure owned and operated by the City of Lewisville and also participate in part ownership of the Upper Trinity Regional Water District, and we'd also like to have that information as she also requested.

MS. FAGERHOLM: Yes, sir. That is noted for our record. Thank you.

I think we have a hand in the back.

MS. WOOLWORTH: Hi, my name is Paula Woolworth.

MS. FAGERHOLM: Just one second.

THE REPORTER: I'm sorry?

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MS. FAGERHOLM: Just one second.

MS. WOOLWORTH: Hi, my name is Paula Woolworth. And the question I have -- I'm very well aware we're talking about Lewisville, but since you're talking about the conservation pool and its capacity to, you know, be maintained and the fact that if this study may result in some work that is 2017 to 2018 completed, that's a number of years between now and then.

And so if the -- perhaps a condition might arise like it did in 2007 when we had a significant amount of rain, and I know the lake came into my backyard.

I also live above the dam, though, and so I'm wondering what, if anything, is being done like this relative to Lake Ray Roberts, and is its flow being controlled into Lake Lewisville so that the conservation pool doesn't get taxed?

MR. VAZQUEZ: To answer your first question, yes, the -- the risks at Ray Roberts are -- I'm sorry, that's probably your last question, but I'm going to work backwards.

The risks at Ray Roberts are being addressed. It is currently a high-to-moderate risk structure. So the releases are being manage -- we are managing the path between Ray Roberts and Lewisville in

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the best way we can as far as the risks. It's a hard question to answer.

But the other question or your first question regarding the water backing up in 2007, all I can really say to that is, for this particular study, the majority of our consequences being considered are for the downstream area. And so the area upstream of the dam does get considered as part of the study but not as much. Did that answer your question?

MS. WOOLWORTH: Mostly.

MR. VAZQUEZ: That's good. I'm sorry.

THE REPORTER: Could you spell your last name for me, ma'am?

MS. WOOLWORTH: Woolworth, W-O-O-L-W-O-R-T-H.

THE REPORTER: I appreciate it. Thank you.

MR. VAZQUEZ: And just to follow up on that, that right now the study is for Lewisville. Because as Anita pointed out earlier, the prioritization is to address the worst first, and so Lewisville is worse than Ray Roberts. But we will continue and we are always continuing our routine O&M and implementing our interim risk reduction measures, so.

MS. WOOLWORTH: Thank you.

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MS. BRANCH: Yeah, as Jason said, we're implementing interim risk reduction measures. You saw the list of the ones we've done at Lewisville. Well, Lewisville is only one of the 25 projects that we've looked at, and we've also implemented interim risk reduction measures where the risk was not as low as we wanted it to be at other projects, as well.

MS. FAGERHOLM: All right. Does anyone else have any more comments or questions? One hand in the back.

MS. WOOD: I just want to put my request also to the Corp that they release the information as far as flood risk for Lewisville so that homeowners can make an informed decision as to the amount or whether or not they need flood insurance and what their actual risk is. I think to keep that private is doing a disservice to the community.

THE REPORTER: Could you please identify yourself, ma'am? I'm sorry.

MS. WOOD: I'm sorry. Sharon Wood.

THE REPORTER: Okay. Thank you. I appreciate it.

MS. FAGERHOLM: Thank you. Thank you, Sharon, your comment has been noted.

Any more? And, again, we're accepting

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comments throughout the study process, but comments within the next 30 days are the most helpful to us. So please contact Ms. Hollie Hunter.

And, again, these slides will be on the internet page for your use at approximately 9:00 p.m.

Ms. Vicki, did you need any more clarifications?

THE REPORTER: No, I think everybody spelled for me.

MS. FAGERHOLM: Okay.

THE REPORTER: Thank you. I appreciate it.

MS. FAGERHOLM: Yes, ma'am. Well, this concludes our presentation. Thank you so much for your input.

(Meeting adjourned at 7:59 p.m.)

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STATE OF TEXAS)
COUNTY OF DENTON)

I, Vicki L. Smith, Certified Shorthand Reporter in and for the State of Texas, hereby certify that the foregoing pages numbered 1 through 18 constitute a full, true and accurate transcription of my stenographic notes of the proceedings held on August 20th, 2013, in the above-referenced matter.

Signed this 30th of August, 2013.

Vicki L. Smith

NDTCA Signed Electronic Transcript

VICKI L. SMITH, Texas CSR #8061
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DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

October 30, 2015

PUBLIC MEETING NOTICE
LEWISVILLE DAM SAFETY MODIFICATION STUDY
ENVIRONMENTAL IMPACT STATEMENT UPDATE
LEWISVILLE LAKE, DENTON COUNTY

The U.S. Army Corps of Engineers (USACE) Fort Worth District, is hosting an open house meeting to inform the public of developments in the ongoing Lewisville Dam Safety Modification Study (DSMS) and associated Environmental Impact Statement (EIS).

Lewisville Lake and its associated dam are located in the Trinity River Basin along the Elm Fork of the Trinity River in the southern portion of Denton County, Texas. The lake is located immediately to the north of the City of Lewisville and approximately 22 miles northwest of the City of Dallas. USACE-owned project lands downstream of the dam have the greatest potential to be directly impacted by the proposed dam modifications and therefore are the primary focus of this study and associated EIS.

USACE is proposing risk reduction measures to minimize the potential for and consequences of a downstream flooding event associated with dam failure by remediating seepage instability at Lewisville Dam for safe and effective functioning of the lake and dam at authorized capacity, while reducing the risk to the downstream public. The exact nature of these measures is being determined as part of the on-going comprehensive analysis. The EIS being prepared will evaluate proposed activities associated with the DSMS, as well as analyze, identify, and disclose the potential environmental effects of those actions.

While the comprehensive analysis and EIS preparation continues, USACE is hosting this open house to update and solicit input from Federal, state, and local agencies, elected officials, and the interested public in order to provide full consideration of their views and information as part of the National Environmental Policy Act (NEPA) process. Subject matter experts will be available to address specific questions on the study. The public meeting will be held from 6:00 p.m. to 8:00 p.m. on November 16, 2015, at the following location:

Medical Center of Lewisville – Grand Theater
Black Box Theater Room
100 North Charles Street
Lewisville, Texas 75057

Comments and questions will be taken at the meeting via comment cards. Those unable to attend this meeting can forward comments and questions to Ms. Marcia Hackett, U.S. Army Corps of Engineers, Regional Planning and Environmental Center (RPEC), NEPA and Cultural Resources Section, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300 or by email at marcia.r.hackett@usace.army.mil.

Eric W. Verwers
Director, Regional Planning and
Environmental Center

HEALTHCARE | HEALTHCARE | HEALTHCARE

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VOLT Workforce Solutions

Volt Workforce Solutions Job Fair:
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❤ ADOPTION: ❤ Children's Book Author (will be stay-Home Parent) & Attorney yearn for 1st baby. Expenses paid. 1-800-844-1670 ❤ Barb & Mul ❤

GARAGE SALES

COPPELL

St. Marin Apartments Community Sale - Sat., 11/7, 7am-1pm. Music & food! 1717 E. Belt Line Rd Coppell, TX 75019

LEWISVILLE

HUGE Garage Sale: Fri, 11/6, 8am-12 noon. New & like-new items, clothes, home furnishing & MUCH MORE! **250 Legends Drive, Lewisville** (old town Lewisville on corner of Kealy & Legends)

LEWISVILLE

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1897 W. Main Street
in back parking lot
SAT, NOV. 14th 7a-2p

THE COLONY

BIG Moving Sale! Garage full of tools: saw table, drills, car ramps and stands; men's suits and casual clothing; women's clothes and shoes; girls dolls, bedding, stuffed animals; home decor; area rugs, pictures, dishes; Xmas decor: tree and lights; girl;s 3-pc bedroom suite $350; office furniture $1200; armoire $75, Fri. 11/13 - Sat 11/14 7am-4pm. 6401 High Cliff

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NOTICES | NOTICES | NOTICES

Public Notice

In accordance with Title 19 Texas Administrative Code, Chapter 109, Subchapter AA, Division 1, Section 109.1005, ResponsiveEd will present the 2014-2015 Annual Financial Management Report for Texas College Preparatory Academies and Premier High Schools on Thursday, November 19, 2015, at 10:30 a.m. The meeting will be held at the ResponsiveEd Corporate Office located at 1301 Waters Ridge Drive, Lewisville, TX 75057.

PUBLIC NOTICE

The vehicle described below have been impounded due to abandonment, accident involvement, or arrested subject. In compliance with VTCS-5429b-2 Article V, this notice is to apprise the registered owners or lienholders of their right to reclaim the vehicles within twenty (20) days. Failure to reclaim the vehicles and consent to the sale of the abandoned motor vehicles at public auction.Payment must be made to: Brad's Towing Service, Inc., 1630 Riverview Dr. Lewisville, TX 75056. For further information please call (972) 939-8099.

Impound Number	Year	Make	VIN
B510004	1993	AUDI	WAUDJ58CXPA089524
B509133	2000	CHEVROLET	2G1WF55K0Y9381214
B509145	2007	CHEVROLET	1A8HX58217F567495
B509084	1994	CHEVROLET	1GNEC16K3RJ442135
B509100	1998	CHEVROLET	1GCCS1949W8139010
B509051	2002	CHEVROLET	1GNEC13Z12R271393
B509019	1997	CADILLAC	1G6KE54Y6VU243791
B509005	2004	CHRYSLER	1C3EL46XX4N188693
B509085	2002	CHRYLSER	2C4GP54L62R590435
B510033	2007	FORD	3FAHP071X7R256028
B509043	1993	FORD	1FTDF15N0PLB16740
B509035	2006	FORD	1FTSE34P76D19231
B509036	2006	FORD	1FTSS34P36DA21132
B509042	2001	ISUZU	4SZCK58W214303017
B510021	2009	LINCOLN	1LNHM94R89G600205
B509116	2000	MITSUBISHI	4A3AA46L7YE150645
B509089	2003	MAZDA	4F2CZ04113KM53140
B509045	1986	NISSAN	JN6ND06S4104157
B509092	2005	NISSAN	1N4AL11D45C197530
B509086	2006	SUZUKI	KL5JD56ZZ6K456970
B509138	1998	TOYOTA	JT3GM84R1W0024928
B509139	1994	TOYOTA	JT2AE04B4R0069698
B509108	1998	TOYOTA	4T1BG22K4WU364188

AUCTIONS

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NOTICES | NOTICES | NOTICES

NOTICE TO CREDITORS OF THE ESTATE OF WILLIAM ILLINGSWORTH NEWMAN, DECEASED

NOTICE IS HEREBY GIVEN that Letters Testamentary upon the ESTATE OF WILLIAM ILLINGSWORTH NEWMAN, DECEASED, were granted to Karen Sue Newman Mulholland, of Denton County, Texas, on November 2, 2015, by the Denton County Probate Court in Docket No. PR-2015-00880.

ALL PERSONS having claims against the Estate, which is being administered in the County of Denton, are hereby required to present the claims to the Independent Executor, Karen Sue Newman Mulholland, c/o Kelly M. Davis & Associates, LLC, Davis Professional Building, 550 S. Edmonds Ln., Suite 201, Lewisville, TX 75067, before suit upon the claim is barred by the general statutes of limitation, before the Estate is closed, and within the time prescribed by law.

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Full-time. Bachelor's degree in social work or related field, experience in volunteer supervision. Flexible scheduling and transportation necessary.
Submit application from website (www.casadenton.org) to **application@casadenton.org** or by mail to CASA of Denton County, 614 N. Bell Avenue, Denton, TX 76209.

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ORDINANCE NO. 15-02A

AN ORDINANCE OF THE TOWN OF DOUBLE OAK, TEXAS, DESIGNATING AN OFFICIAL NEWSPAPER FOR THE TOWN OF DOUBLE OAK FOR THE FISCAL YEAR 2015-2016; PROVIDING A REPEALING CLAUSE; PROVIDING A SEVERABILITY CLAUSE; AND, PROVIDING AN EFFECTIVE DATE.

DULY PASSED by the Town Council of the Town of Double Oak, Texas, on the 21 st day of September, 2016.

APPROVED:
Mike Donnelly
MAYOR

ATTEST:
Charlotte Allen
TOWN SECRETARY

LEGAL NOTICE

NOTICE OF PUBLIC MEETING
ENVIRONMENTAL IMPACT STATEMENT,
LEWISVILLE DAM SAFETY MODIFICATIONS
CITY OF LEWISVILLE, DENTON COUNTY, TEXAS

The U.S. Army Corps of Engineers (USACE) Fort Worth District, is hosting an open house meeting to inform the public of developments in the ongoing Lewisville Dam Safety Modification Study (DSMS) and associated Environmental Impact Statement (EIS).

USACE is proposing risk reduction measures to minimize the potential for and consequences of a downstream flooding event associated with dam failure by remediating seepage instability at Lewisville Dam for safe and effective functioning of the lake and dam at authorized capacity, while reducing the risk to the downstream public. The EIS being prepared will evaluate proposed activities associated with the DSMS, as well as analyze, identify, and disclose the potential environmental effects of those actions. USACE-owned project lands downstream of the dam have the greatest potential to be directly impacted by the proposed dam modifications.

USACE is hosting this open house to update and solicit input from the interested public in order to provide full consideration of their views and information as part of the National Environmental Policy Act (NEPA) process. Subject matter experts will be available to address specific questions on the study. The public meeting will be held from 6:00 - 8:00 p.m. on November 16, 2015, at the Medical Center of Lewisville – Grand Theater, Black Box Theater Room located at 100 North Charles Street, Lewisville, Texas 75057.

Comments and questions will be taken at the meeting via comment cards. Those unable to attend this meeting can forward comments and questions to Ms. Marcia Hackett, U.S. Army Corps of Engineers, CESWF-PEC-TN, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300 or by email at marcia.r.hackett@usace.army.mil.

PUBLIC NOTICES

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NOTICE OF PUBLIC MEETING ENVIRONMENTAL IMPACT STATEMENT

NOTICE OF PUBLIC MEETING
ENVIRONMENTAL IMPACT STATEMENT, LEWISVILLE DAM SAFETY MODIFICATIONS
CITY OF LEWISVILLE,
DENTON COUNTY, TEXAS

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Appeared in: ***The Dallas Morning News*** on Sunday, 11/08/2015

Attachment 1 No Attachment Uploaded ADD HELP	*Attachment 2* No Attachment Uploaded ADD HELP

Portable Buildings

WOOD BUILDINGS
(Unfinished Inside)

12x16	$2,295
14x24	$4,195
16x32	$4,795
24x28	$7,895
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LEGAL BIDS & NOTICES

- Bankruptcy, Court Sales
- Bids and Proposals
- Legal Notices

Bids & Proposals

PROPOSAL NOTICE

THE DALLAS-FORT WORTH INTERNATIONAL AIRPORT is accepting separate sealed proposals for the following items at the herein stated location until the proposal due date and time stated below.

SOLICITATION: 8005040 - Analytical Laboratory Testing Services
PROPOSAL DUE DATE AND TIME: Monday, December 07, 2015 @ 2:00 PM (Central Time)
SMALL BUSINESS ENTERPRISE (SBE) GOAL: 20%

SOLICITATION: 8005041 - Asbestos Analytical Laboratory Testing Services
PROPOSAL DUE DATE AND TIME: Monday, December 07, 2015 @ 2:00 PM (Central Time)
SMALL BUSINESS ENTERPRISE (SBE) GOAL: 5%

LOCATION TO SUBMIT PROPOSALS: DFW Airport Headquarters, Procurement Department, 2400 Aviation Drive, DFW Airport, TX 75261.
Specifications may be

Bids & Proposals

Manhattan, Byrne, JRT, 3i –a Joint Venture

Manhattan, Byrne, JRT, 3i, a Joint Venture ("MBJ3") as Construction Manager at Risk will receive sealed bids for a construction subcontract at DFW Airport titled "Terminal B Phase 3" Contract No. 9500406.13 for the following package. Bids shall be on a lump sum basis and include the following bid packages.

Package 08A: Glass which includes interior glass walls, miscellaneous glass lite, unframed mirrors, aluminum storefront and doors, and the Automatic Entrance Doors Est. Value **$ 900,000 to $1,100,000** M/WBE Goal 10%

DOCUMENTS: For all packages CDs will be available on or after TUESDAY, November 10, 2015 between 1:00 p.m. and 4:00 p.m. at the MBJ3 office located at 3003 S. Service Road, Trailer C-4, DFW Airport, Texas 75261. Printed copies for purchase will be available thru MS Dallas Reprographics; 1130 Dragon Street # 110 St., Dallas, Texas 75207, telephone (214) 521-7000. CD's or Plans can be shipped to out-of-town locations at the Contractor's expense. Bidding documents may be examined locally in plan rooms.

A PRE-BID CONFERENCE will be held 1:00 p.m. - 2:00 p.m. on **TUESDAY, November 17, 2015** Trailer C-4, 3003 S. Service Road, DFW Airport Texas 75261. **A PRE-BID SITE VISIT**. A site walk thru of the Terminal B exterior, interior non-secure areas for the above listed packages is scheduled for **Tuesday, November 17, 2015** at approximately 2:30 p.m. Walk thru will start immediately at the conclusion of the Pre-BID Conference at Terminal B, DFW Airport, TX 75261. For additional information, please contact Bill Summers at (214) 438-6777.

BIDS WILL BE RECEIVED until 2:00 p.m. LOCAL TIME, Tuesday, December 1, 2015 in the lobby of the DFW Airport Development and Engineering Building, 3003 South Service Road, DFW Airport 75261. **Bids received after this time will not be accepted.** The CMAR must be notified the day before sending sealed proposals by overnight delivery service. Otherwise, the proposal may not get date and time stamped and could be considered late.

MBJ3 reserves the right to reject any or all proposals, to waive technicalities, to advertise for new proposals, or proceed to do the work by other means when in the best interests of MBJ3. No Bidder may withdraw its Proposal within ninety (90) calendar days after the actual date of the opening thereof.

MBJ3's policy is to obtain maximum practical M/WBE (DBE) participation at all tiers. In furtherance of this policy, MBJ3 has implemented an M/WBE (DBE) Program for all bidders in which they are required to demonstrate good faith efforts to obtain maximum practical M/WBE (DBE) participation and to contractually commit to a percentage of M/WBE (DBE) participation if awarded the project. The successful **bidders** will be required to demonstrate, through a written narrative submitted with their pricing proposal, their efforts to involve and utilize M/WBE's (DBE) at the recommended minimum goal levels listed above. You may contact Ricardo Cardoza at 214-438-6870 for a list of M/WBE (DBE) contractors in the DFW area that may be interested in this project.

Subcontracting opportunities include subcontract labor and M/WBE, material suppliers for all of the above trades

BID SECURITY in the amount of five percent (5%) of bid amount must accompany each bid in accordance with the instructions to Bidders.

Original Signed by
Bill Summers MBJ3 Senior Estimator

Bids & Proposals

CITY OF KELLER REQUEST FOR QUALIFICATIONS

RFQ's will be received at the Keller Town Hall Public Works Department, 1100 Bear Creek Pkwy., Keller, Texas until 5:00 p.m. (local time),Wednesday, November 25, 2015, for a contract to furnish all labor, materials and equipment to perform work for the following:

Design & Professional Engineering Services for the Transportation Alternatives Program (TAPS) Mt. Gilead Trail Construction

Copies of the Request for Qualifications (RFQ) may be examined and obtained at the Keller Town Hall, Department of Public Works, 1100 Bear Creek Pkwy., Keller, TX 76248 free of charge. They are also available at www.cityofkeller.com.

Contact Information:

Keith Fisher, P.E., Director of Public Works, 817-743-4081 or kfisher@cityofkeller.com.

BID Mailing Address:
City of Keller
P.O. Box 770
Keller, TX 76244

Manhattan Construction Company is requesting proposals for Mechanical Testing and Balancing on the Frisco Multi-Use Special Event Center and Dallas Cowboys Headquarters located in Frisco, TX. Proposals are due at 6300 N. Central

Bids & Proposals

contact Matt Barker of Manhattan for access to plans and specifications as well as general questions, 214-357-7400 (mbarker@manhattanconstruction.com).

Health Services of North Texas, Inc. is now accepting proposals for Architectural & Design Services relating to the construction of a new medical center building in Denton, TX. Proposals will be accepted until 4:30 pm on November 23, 2015 at the Health Services of North Texas Office-4401 N. I-35, Suite 312, Denton, TX 76207. Copies of the detailed RFP packet are available from Larry Bisno, at Lbisno@healthntx.org or 940-381-1501 x 3002. For more information please contact Larry Bisno at 940-381-1501.

Legal Notices

LEGAL NOTICE

The pre-meeting of the Board of Adjustment of the City of Garland, TX will be held Wed, Nov 18, 2015 at 6:30 p.m. in the Goldie Locke Room of the Charles E Duckworth Building, 217 N Fifth St to review/discuss the agenda items.

A meeting of the Board of Adjustment of the City of Garland, TX will be held Wed, Nov 18, 2015 at 7:00 p.m. in the Goldie Locke Room of the Charles E Duckworth Building, 217 N Fifth St to consider the following;

AGENDA
1. Consider a request to increase the allowable

Legal Notices

increase the allowable lot coverage from 45% to 54% by Varkey Jose at property commonly known as 914 Meadow Flower Ln (BA File 15-14).

MISC
1. In accordance with Article VIII Section 1 of the amended version of the Rules of Procedures: The Board shall elect a Chairperson, First Vice Chairperson and Second Vice Chairperson annually at the first regular meeting in September after annual appointments have been made by the City Council.

CPN 6538 Pub. 11/08/2015

LEGAL NOTICE

A meeting of the Plan Commission of the City of Garland, Texas will be held Monday, November 23, 2015 at 7:00 p.m. in the Goldie Locke Room of the Duckworth Utility Services Building, 217 North Fifth Street to consider the following;

LEGAL NOTICE

1. Arando Planning requests approval of a replat of Lot 12R, Block B, Bella Vista Addition First Installment, to reconfigure and combine three existing lots into a single tract. This property is located at 2900 Anita Street. (File P 15-30)(District 5).

CPN 6537 Pub. 11/08/2015

Watch news

Legal Notices

NOTICE OF PUBLIC MEETING ENVIRONMENTAL IMPACT STATEMENT, LEWISVILLE DAM SAFETY MODIFICATIONS CITY OF LEWISVILLE, DENTON COUNTY, TEXAS

The U.S. Army Corps of Engineers (USACE) Fort Worth District, is hosting an open house meeting to inform the public of developments in the ongoing Lewisville Dam Safety Modification Study (DSMS) and associated Environmental Impact Statement (EIS).

USACE is proposing risk reduction measures to minimize the potential for and consequences of a downstream flooding event associated with dam failure by remediating seepage instability at Lewisville Dam for safe and effective functioning of the lake and dam at authorized capacity, while reducing the risk to the downstream public. The EIS being prepared will evaluate proposed activities associated with the DSMS, as well as analyze, identify, and disclose the potential environmental effects of those actions. USACE-owned project lands downstream of the dam have the greatest potential to be directly impacted by the proposed dam modifications.

USACE is hosting this open house to update and solicit input from the interested public in order to provide full consideration of their views and information as part of the National Environmental Policy Act (NEPA) process. Subject matter experts will be available to address specific questions on the study. The public meeting will be held from 6:00 - 8:00 p.m. on November 16, 2015, at the Medical Center of Lewisville – Grand Theater, Black Box Theater Room located at 100 North Charles Street, Lewisville, Texas 75057.

Comments and questions will be taken at the meeting via comment cards. Those unable to attend this meeting can forward comments and questions to Ms. Marcia Hackett, U.S. Army Corps of Engineers, CESWF-PEC-TN, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300 or by email at marcia.r.hackett@usace.army.mil .

Dallas Independent School District

To: All Interested Agencies, Groups, and Individuals

This is to give notice that the Dallas Independent School District has applied for a School-Based Health Center Program grant from Health Resources and Services Administration (HRSA) of the Department of Health and Human Services (HHS). The Dallas Independent School District proposes to renovate a portion of L.G. Pinkston High School in order to create a School-Based Health Center to serve the population. The address of the property is 2200 Dennison Street, Dallas, TX 75212.

The purpose of this notice is to inform the public of this proposed action within the floodplain as required by Section 2(a)(4) of Executive Order 11988 for Floodplain Management as the proposed action is within and/or affects a floodplain.

Additional information may be obtained by contacting: Youth and Family Center, Attn: Lynnie Smith, Director.

Written comments on the proposed action and potential impacts to floodplains must be submitted to the following address on or before November 15, 2015, by contacting: Lynnie Smith, Director, Youth and Family Center at 2909 N Buckner Blvd Suite 504 Dallas, TX 75228.

Dallas Independent School District

Thursday, November 19, 2015
5:30 p.m.
Ada L. Williams Auditorium
3700 Ross Ave., Dallas, TX 75204
Targeted Improvement Plans for Improvement Required (IR) and Formerly Improvement Required (FIR) Schools

Dallas Independent School District will hold a hearing to inform the public about the School Improvement Plans for campuses rated Improvement Required (IR) and Formerly Improvement Required (FIR) Schools.

The Meeting will take place at 5:30 p.m., Thursday, November 19, in the Ada L. Williams Auditorium, 3700 Ross Ave.

locales

El Tiempo

El meteorólogo Néstor Flecha provee el reporte del tiempo por KXTX Telemundo 39 de lunes a viernes en el noticiero de las 5 y 10 p.m.

Telemundo 39 http://www.telemundodallas.com/el-tiempo

Sábado	Domingo	Lunes	Martes	Miércoles
Muy Nublado	Parcialmente nublado	Parcialmente nublado	Muy Nublado	Tormenta
Máx.: 64	Máx: 62	Máx: 66	Máx: 74	Máx: 67
Mín.: 46	Mín: 48	Mín: 58	Mín: 62	Mín: 51

GUÍA DE LA COMUNIDAD

DAVID WOO/DMN

Caridades Católicas de Dallas tendrá un taller sobre ciudadanía.

Seminario sobre el compostaje: La ciudad de Dallas tendrá un seminario gratuito sobre los beneficios del compostaje. El evento será el sábado, 7 de noviembre de 8 a.m. a 2:30 p.m. en la Primaria John Ireland, 1515 North Jim Miller Road, Dallas. Información: 214-671-9139

Ciudadanía: Caridades Católicas ofrecerá talleres para ayudar a residentes a naturalizarse como parte de la campaña "Nuevos ciudadanos". El taller será el sábado 7 de noviembre a las 9:30 a.m. en el edificio de la organización, 9461 LBJ Freeway, Suite 100, Dallas. El costo de inscripción es de $40. Información: Luis Arango 214-634-7182

Feria de salud y seguridad: El Departamento de Policía de Dallas y el programa UNIDOS organizará una feria de salud y seguridad en el que habrá mesas para de información y vendedores de salud y seguridad, comida gratis, mariachis y rifas. Sábado 7 de noviembre de 10 a.m. a 1 p.m. en el Centro de Recreación Jaycee Zaragoza, 3114 Clymer, Dallas. Información: Sargento Roberto Muñoz 214-789-9661 o Centro de Recreación Jaycee Zaragoza 214-670-6188

Asientos de carro para niños: El Injury Prevention Center of Greater Dallas del Hospital Parkland tendrá un día dedicado a examinar la instalación y la calidad de los asientos de carros para niños. El evento será el sábado 7 de noviembre de 10 a.m. a 2 p.m. en el estacionamiento F de Globe Life Park, 1000 Ballpark Way, Arlington. Para hacer una reservación llame al 214-590-4455. Se requiere llevar su carro, el asiento para niños y a sus niños para la evaluación. Información: 214-590-4455

Talleres de ciudadanía e inmigración: Proyecto Inmigrante ICS, Inc. ofrecerá foros informativos y talleres de ciudadanía gratuitos. Fechas:
Mega taller de ciudadanía el sábado 7 de noviembre de 9 a.m. a 3 p.m en el Tarrant County College South Campus, 5301 Campus Drive, Fort Worth.
Foto de inmigración el domingo 8 de noviembre a las 6 p.m. en la iglesia Católica San José, 807 N. Anglin St., Cleburne.
Foro de inmigración el viernes 20 de noviembre a las 5:30 p.m. en la Escuela primaria D. McRae Corazón de María, 3316 Avenue N., Fort worth.
Taller de ciudadanía el sábado 19 de diciembre de 9 a.m. a 3 p.m en la Iglesia Católica Inmaculado, 201 Thornhill, Fort Worth.
Información: 888-793-2182 ext. 3201 o www.proyectoinmigrante.org/

Desfile de veteranos: El desfile de veteranos de este año en Dallas será el 11 de noviembre. La celebración comenzará con una ceremonia de alrededor de una hora enfrente de City Hall a las 11 a.m., continuado por el desfile que empezará en Reunion Arena, y seguirá una ruta por el norte de Houston Street, este de Main Street, sur de Ervay Street, oeste de Young Street, sur de Akard Street, y concluirá enfrente de City Hall. Información: http://www.vetsdayindallas.org/

Consulado sobre ruedas: El Consulado General de México hará visitas a Garland para servicios de matrículas consulares y pasaportes. Las fechas son el lunes 9, martes 10 y jueves 11 de noviembre de 7:30 a.m. a 12 p.m. en Central Park Church of God, 1901 E. Centerville Road, Garland. Para hacer una cita llame al 1-877-639-4835 o en la página web https://citas.sre.gob.mx/mexitel_web/cita. Los documentos que debe presentar para los trámites son un acta de nacimiento original, una identificación oficial que coincida con el nombre en el acta de nacimiento, y un comprobante de domicilio original a su nombre. Información: 214-932-8670

Escuelas públicas especiales: El Distrito Escolar Independiente de Dallas abrirá las puertas de escuelas para que los padres de familia interesados en inscribir o transferir a sus hijos a planteles con programas educativos especiales conozcan más sobre las instituciones. Aceptarán solicitudes para el año escolar que comienza en agosto del 2016. Las escuelas son las siguientes:

- **Solar Preparatory STEM School,** un colegio de ciencia, tecnología, ingeniería y matemáticas para niñas en James B. Bonham tendrá inscripciones para kindergarten, primero y segundo de primaria, el jueves 12 de noviembre de 6 a 7 p.m. en 617 N. Henderson Ave., Dallas.
- **Innovation, Design, Entrepreneurship Academ**y, una escuela de innovación, diseño y empresariado en la primaria James W. Fannin, tendrá inscripciones para noveno año, el miércoles 18 de noviembre de 4 a 5:30 p.m. en 4800 Ross Ave., Dallas.
- **STEAM Middle School,** una magnet de ciencia, tecnología, ingeniería, artes y matemáticas en la secundaria D.A. Hulcy tendrá inscripciones para sexto año el lunes 23 de noviembre de 6 a 7 p.m. en 9339 South Polk St., Dallas. Información: 972-925-3700 o www.dallasisd.org

Asientos de carro para niños: El Injury Prevention Center of Greater Dallas del Hospital Parkland tendrá un día dedicado a examinar la instalación y la calidad de los asientos de seguridad para niños. El evento será el sábado 7 de noviembre de 10 a.m. a 2 p.m. en el estacionamiento F de Globe Life Park, 1000 Ballpark Way, Arlington. Para hacer una reservación llame al 214-590-4455. Se requiere llevar su carro, el asiento para niños y a sus niños para la evaluación. Información: 214-590-4455

Trabajos de diversidad: La feria de trabajo para diversidades Diversity Employment Day Career Fair invita a los residentes del Norte de Texas a solicitar empleos que varían de nivel principiante a profesional, en las compañías como Cardinal Logistics, Federal Reserve Bank of Dallas, Texas Health Resources y 20 compañias más. El evento será el martes 12 de noviembre de 11 a.m. a 3 p.m. en Inn Conference Center Dallas, 6055 LBJ Freeway, Dallas. La feria es gratuita y para mayores de 18 años, y se requiere que los candidatos estén vestidos para entrevistas y lleven copias de su currículum. Puede enviar su currículum por adelantado al fasttrack@citycareerfair.com. Información: 562-863-9042 o sarah@citycareerfair.com

Salud del hombre: El Hospital Parkland tendrá una feria de salud para hombres. Habrá exámenes de colesterol, presión, glucosa, VIH y sida, y de índice de masa corporal. También habrán vacunas para la gripe. El taller será el sábado 14 de noviembre de 8:30 a.m. a 1 p.m.en Dallas Public Library, 1515 Young St., Dallas. Para registrarse llame a Ron Session 214-266-0651 o mande un correo electrónico a Ronald.Session@phhs.org Información: 214-266-0651

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Si no desea recibir Al Día en su domicilio cada miércoles y sábado, llame a la línea de atención al cliente de Al Día al (469) 977- 3740 o mande un correo electrónico a: stopaldia@aldiadallas.com

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No se entregan ejemplares de Al Día los domingos. Para reportar problemas: Comuníquese con Servicio al Cliente al 469-977-3740. Horario de servicio: De lunes a viernes de 6 a.m. a 5 p.m. Sábados y domingos de 6 a.m. a 1 p.m. Para recibir un nuevo ejemplar del diario el mismo día, llame antes de las 10 a.m. de lunes a viernes; 11 a.m. los sábados.
Si quiere ser repartidor de Al Día llame al 214-745-8383 o ingrese al sitio carrier.dallasnews.com

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A TODAS LAS PERSONAS Y PARTES INTERESADAS:

Republic Waste, Limited Partnership, ha solicitado a la Comisión de Calidad Ambiental del Estado de Texas (TCEQ) la emisión del Permiso Propuesto para la Calidad del Aire Número 129401, el cual autoriza la construcción de una Instalación para Fertilizante y Abono Orgánico localizada en 5032 Split Trail Rd, Plano, condado de Collin, Texas 75074. Información adicional con respecto a esta solicitud está contenida en el aviso en la sección de avisos públicos de este periódico.

DN-1470076-01

AVISO DE REUNIÓN PÚBLICA DECLARACIÓN DE IMPACTO AMBIENTAL, MODIFICACIONES DE SEGURIDAD PARA LA REPRESA DE LEWISVILLE CIUDAD DE LEWISVILLE, CONDADO DENTON, TEXAS

El Distrito de Fort Worth del Cuerpo de Ingenieros del Ejército de los Estados Unidos (USACE por sus siglas en inglés), está organizando una reunión pública estilo puertas abiertas para informar al público de los avances en el Estudio para las Modificaciones de Seguridad para la Represa de Lewisville (DSMS por sus siglas en inglés) y la Declaración de Impacto Ambiental (EIS por sus siglas en inglés) asociada con este Estudio.

El USACE está proponiendo medidas de reducción de riesgos para minimizar el potencial y las consecuencias de un evento de inundación aguas abajo asociadas con rotura de la represa. El Estudio propone remediar la inestabilidad de las filtraciones en la Represa de Lewisville para asegurar el funcionamiento seguro y eficaz del lago y la represa a la capacidad autorizada, al mismo tiempo que reduce el riesgo para la población aguas abajo. La EIS evaluará las actividades propuestas asociadas con la DSMS, así como analizar, identificar y divulgar los posibles efectos ambientales de esas acciones. Los terrenos propiedad del USACE aguas abajo de la represa tienen el mayor potencial de verse afectados directamente por las modificaciones propuestas a la represa.

El USACE lo invita a esta reunión estilo puertas abiertas para actualizar y solicitar la opinión del público interesado a fin de considerar sus puntos de vista e información como parte del proceso bajo la Acta de Política Ambiental Nacional (NEPA por sus siglas en inglés). Expertos en la materia estarán disponibles para responder a preguntas específicas sobre el estudio. La reunión pública se llevará a cabo de 6:00 - 8:00 pm el 16 de Noviembre 2015, en el Centro Médico de Lewisville - Grand Theater, Black Box Theater Room ubicado en 100 North Charles Street, Lewisville, Texas 75057.

Comentarios y preguntas serán tomadas en la reunión a través de tarjetas de comentarios. Quienes no puedan asistir a esta reunión puede enviar comentarios y preguntas a la Sra. Marcia Hackett, U.S. Army Corps of Engineers, CESWF-PEC-TN, P.O. Box 17300, Room 3A12, Fort Worth, Texas 76102-0300 o por correo electrónico a marcia.r.hackett@usace.army.mil.

DN-1473073-01

invited on: whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; the accuracy of the agency's estimate of the burden of the proposed information collection; ways to enhance the quality, utility, and clarity of the information to be collected; and ways to minimize the burden of the information collection on respondents, including through the use of automated collection techniques or other forms of information technology.

DATES: Consideration will be given to all comments received by September 12, 2016

ADDRESSES: You may submit comments, identified by docket number and title, by any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *Mail:* Department of Defense, Office of the Deputy Chief Management Officer, Directorate for Oversight and Compliance, 4800 Mark Center Drive, Mailbox #24, Alexandria, VA 22350–1700.

Instructions: All submissions received must include the agency name, docket number and title for this **Federal Register** document. The general policy for comments and other submissions from members of the public is to make these submissions available for public viewing on the Internet at *http://www.regulations.gov* as they are received without change, including any personal identifiers or contact information.

Any associated form(s) for this collection may be located within this same electronic docket and downloaded for review/testing. Follow the instructions at *http://www.regulations.gov* for submitting comments. Please submit comments on any given form identified by docket number, form number, and title.

FOR FURTHER INFORMATION CONTACT: To request more information on this proposed information collection or to obtain a copy of the proposal and associated collection instruments, please write to the Defense Logistics Agency Headquarters, ATTN: Mr. Eric Linneman, DLA Installation Support (DS–S), 8725 John J. Kingman Rd., Ft. Belvoir, VA 22060–6221; or call (703) 767–5019.

SUPPLEMENTARY INFORMATION:

Title; Associated Form; and OMB Number: Defense Logistics Agency (DLA) Police Center Records (POLC); DLA Form 635; OMB Control Number 0704–0514.

Needs and Uses: DLA police require an integrated police records management system, PoliceCenter (POLC), to automate and standardize all of the common record keeping functions of DLA police. POLC provides records management of police operations, including property, incident reports, blotters, qualifications, dispatching, and other police information management considerations. The tool allows authorized users the capability to collect, store, and access sensitive law enforcement information gathered by Police Officers. The tool allows DLA Police to automate many police operational functions and assist with crime rate and trend analysis. Relevant law enforcement matters include, but are not limited to: traffic accidents, illegal parking, firearms records, suspicious activity, response to calls for service, criminal activity, alarm activations, medical emergencies, witnesses, victims, or suspect in a police matter, or any other situation which warrants police contact as outlined in DoD Directives and DLA Policy. In addition to those disclosures generally permitted under 5 U.S.C. 552a(b) of the Privacy Act of 1974, these records contained therein may specifically be disclosed outside the DoD as a routine use pursuant to 5 U.S.C. 552a(b)(3) as follows:

—To Federal, State, and local agencies having jurisdiction over or investigative interest in the substance of the investigation, for corrective action, debarment, or reporting purposes.

—To Government contractors employing individuals who are subjects of an investigation.

—To DLA contractors or vendors when the investigation pertains to a person they employ or to a product or service they provide to DoD when disclosure is necessary to accomplish or support corrective action.

Affected Public: Individuals or households; Business or other for-profit; Not-for-profit institutions.

Annual Burden Hours: 225.

Number of Respondents: 450.

Responses per Respondent: 1.

Annual Responses: 450.

Average Burden per Response: 0.50 hours (30 minutes).

Frequency: On occasion.

Respondents are individuals who work on or visit Defense Logistics Agency Installations and are involved in police matters.

Dated: July 6, 2016.

Aaron Siegel,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 2016–16384 Filed 7–11–16; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Termination of Intent To Prepare a Draft Environmental Impact Statement for the Dam Safety Study, Lewisville Dam, Elm Fork Trinity River, Denton County, Texas

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent; withdrawal.

SUMMARY: The U.S. Army Corps of Engineers (USACE), Fort Worth District, is issuing this notice to advise Federal, state, and local governmental agencies and the public that USACE is withdrawing its Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (EIS) for the Dam Safety Study, Lewisville Dam, Elm Fork Trinity River, Denton County, Texas.

DATES: The Fort Worth District is planning to hold the next public meeting for the Dam Safety Study, Lewisville Dam, Elm Fork Trinity River, Denton County, TX on Tuesday, September 27, 2016 from 6:00–8:00 p.m. in the Black Box Theater Room at the Lewisville Grand Theater. Notice of this meeting will be sent to all appropriate parties at a later date.

ADDRESSES: U.S. Army Corps of Engineers, Regional Planning and Environmental Center, CESWF–PEC–CI (Attn: Ms. Marcia Hackett), 819 Taylor Street, Room 3A12, Fort Worth, TX 76102.

FOR FURTHER INFORMATION CONTACT: Marcia Hackett, Senior Environmental Planner, Regional Planning and Environmental Center. Email address: *marcia.r.hackett@usace.army.mil.*

SUPPLEMENTARY INFORMATION: USACE published an NOI in the **Federal Register** on August 15, 2013 (78 FR 49735) to prepare a Draft EIS pursuant to the National Environmental Policy Act (NEPA) for the Dam Safety Study, Lewisville Dam, Elm Fork Trinity River, Denton County, TX. Public scoping meetings were held on August 20, 2013 and November 16, 2015 to solicit public input on the scope of analysis; significant issues to be evaluated in the Draft EIS; cooperating agencies; direct, indirect and cumulative impacts resulting from the proposed action; and proposed alternatives. Since that time, in the course of project planning and preliminary impact analysis, it no longer appears that impacts associated with project implementation would rise to a level necessitating an EIS, so the Fort Worth District has decided to complete NEPA compliance by preparing an Environmental Assessment instead. Therefore, the Fort Worth District is withdrawing the NOI to prepare a Draft EIS.

Douglas C. Sims,

Chief, Environmental Compliance Branch, Regional Planning and Environmental Center.

[FR Doc. 2016–16517 Filed 7–11–16; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF EDUCATION

[Catalog of Federal Domestic Assistance (CFDA) Number: 84.420A]

Reopening; Application Deadline for Fiscal Year 2015; Performance Partnership Pilots

AGENCY: Office of Career, Technical, and Adult Education, Department of Education.

ACTION: Notice.

SUMMARY: On April 26, 2016, we published in the **Federal Register** (81 FR 24573) a notice inviting applications (NIA) for the Fiscal Year (FY) 2015 Performance Partnership Pilots (P3) competition. The NIA established a deadline date of June 27, 2016, for the transmittal of applications. This notice reopens the competition until July 19, 2016.

DATES:

Deadline for Transmittal of Applications: July 19, 2016.

Deadline for Intergovernmental Review: September 15, 2016.

SUPPLEMENTARY INFORMATION: We are reopening this competition in order to allow applicants more time to prepare and submit their applications. A number of applications received in response to the NIA were not eligible because the applications did not meet all of the requirements in the NIA, including the deadline for the submission of applications. Therefore, we are reopening the competition to allow applicants to submit or resubmit applications that meet all of the requirements in the NIA.

Applicants that have already submitted applications under the FY 2015 P3 competition are encouraged to review their applications and determine whether they have met all eligibility and application requirements, including the original deadline for submission, in the NIA and the application package, which is available on the *Grants.gov* Apply site. Applicants may review a recorded Webinar that discusses the eligibility and application requirements at *http://youth.gov/youth-topics/reconnecting-youth/performance-partnership-pilots/round-2-bidders-conference-recording.*

As stated above, applicants may resubmit applications that may not have met all of the requirements in the NIA. Applicants that have already submitted timely applications that meet all of the requirements of the NIA do not have to resubmit their applications. If a new application is not submitted, the Department will use the application that was submitted before the June 27, 2016, 4:30:00 p.m., Washington, DC time, deadline. Applications that did not meet the June 27, 2016, 4:30 p.m., Washington, DC time, deadline must be resubmitted to be considered for review.

Note: All information in the NIA for this competition remains the same, except for the deadline date. We remind applicants that, to be eligible, the application must be submitted by a State, local, or tribal government. Further, the application must identify two or more discretionary Federal programs [1] that will be included in the pilot, at least one of which must be administered (in whole or in part) by a State, local, or tribal government. These programs must be discretionary programs administered by one of the agencies to which the P3 authority provided in the Consolidated and Further Continuing Appropriations Act, 2015 (2015 Appropriations Act) or the Consolidated Appropriations Act, 2016 (2016 Appropriations Act) applies. These agencies are the Departments of Education (ED), Health and Human Services (HHS), Justice (DOJ),[2] and Labor (DOL), the Corporation for National and Community Service (CNCS), and the Institute for Museum and Library Services (IMLS).[3] Further, applicants are reminded that, to be eligible for the FY 2015 competition, applications must include some eligible FY 2015 funds from programs at ED, HHS, DOL, CNCS, and IMLS. Applicants may also include FY 2016 funds in their applications, including programs funded under DOJ's Office of Justice Programs, due to the authority in the 2016 Appropriations Act. However, if an applicant intends to use solely FY 2016 or FY 2017 funds, it is not eligible to be a FY 2015 pilot.

FOR FURTHER INFORMATION CONTACT: Marilyn Fountain, U.S. Department of Education, 400 Maryland Avenue SW., Room 11026, Potomac Center Plaza (PCP), Washington, DC 20202. Telephone: (202) 245–7346. Email address: *disconnectedyouth@ed.gov.* Or Rosanne Andre, U.S. Department of Education, 400 Maryland Avenue SW., Room 11070, PCP, Washington, DC 20202. Telephone: (202) 245–7789. Email address: *disconnectedyouth@ed.gov.*

If you use a telecommunications device for the deaf (TDD) or a text telephone (TTY), call the Federal Relay Service (FRS), toll free, at 1–800–877–8339.

Accessible Format: Individuals with disabilities can obtain this document and a copy of the application package in an accessible format (*e.g.,* braille, large print, audiotape, or compact disc) on request to either of the program contact persons listed under **FOR FURTHER INFORMATION CONTACT** in this notice.

Electronic Access to This Document: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available via the Federal Digital System at: *www.gpo.gov/fdsys.* At this site you can view this document, as well as all other documents of this Department published in the **Federal Register**, in text or Portable Document Format (PDF). To use PDF you must have Adobe Acrobat Reader, which is available free at the site.

You may also access documents of the Department published in the **Federal Register** by using the article search feature at: *www.federalregister.gov.* Specifically, through the advanced search feature at this site, you can limit your search to documents published by the Department.

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[1] Discretionary funds are funds that Congress appropriates on an annual basis, rather than through a standing authorization. They exclude ''entitlement'' (or mandatory) programs such as Social Security, Medicare, Medicaid, most Foster Care IV–E programs, Vocational Rehabilitation State Grants, and Temporary Assistance to Needy Families. Discretionary programs administered by the Agencies (as defined in the NIA) support a broad set of public services, including education, job training, health and mental health, and other low-income assistance programs.

[2] Under the language of the 2015 Appropriations Act, applicants may not propose to blend or request any waiver of program requirements associated with FY 2015 funds from DOJ's Office of Justice Programs in this competition. However, they may propose to braid those funds in this round of pilots. Additionally, applicants may include (by blending, braiding, or requesting associated waivers of program requirements) FY 2016 funds from DOJ's Office of Justice Programs.

[3] The 2016 Appropriations Act authorizes the Department of Housing and Urban Development (HUD) to enter into performance agreements with respect to FY 2016 Homeless Assistance Grants. HUD is not authorized to enter into performance agreements that will be established under the April 26, 2016 NIA. An NIA for FY 2016 pilots that may include FY 2016 Homeless Assistance Grants is expected to be issued later this year.

NOTICE OF AVAILABILITY

ENVIRONMENTAL ASSESSMENT AND DRAFT FINDING OF NO SIGNIFICANT IMPACT, PROPOSED DAM SAFETY MODIFICATIONS, LEWISVILLE DAM, ELM FORK OF THE TRINITY RIVER, LEWISVILLE, TEXAS

Pursuant to the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers (USACE), Fort Worth District, has prepared and is currently seeking comments on an Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas.

The purpose of the Proposed Action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address identified deficiencies. Under the proposed action, the USACE would reduce risk of dam failure from seepage deficiencies at two different locations by constructing downstream inverted filter berms with associated collection trenches for seepage flow at each location. The USACE would reduce the risk of dam failure associate with spillway instability by construction post-tensioned anchors with an upstream geomembrane cutoff to support the spillway structure, and overlay the apron on the downstream side of the spillway to prevent the apron panels from moving during spillway flow events. All the construction activities associated with the proposed action would be conducted on Lewisville Lake federal project lands.

The EA is publicly available and the USACE is soliciting comments from the public; federal, state, and local agencies and officials; Native American Tribes, and other interested parties regarding the evaluation of potential impacts associated with the proposed action.

Copies of the EA and draft FONSI may be reviewed online at the USACE, Fort Worth District Website: http://www.swf.usace.army.mil/About/Organization/PPMD/Peer-Review-Plans/; and at the following locations:

Lewisville Public Library
1197 West Main Street
Lewisville, Texas 75067

Coppell Public Library
500 Southwestern Boulevard
Coppell, Texas 75019

Farmers Branch Manske Library
13614 Webb Chapel Road
Farmers Branch, Texas 75234

Valley Ranch Library
401 Cimarron Trail
Irving, Texas 75063

J. Erik Jonsson Central Library
1515 Young Street
Dallas, Texas 75201

Oak Lawn Branch Library
4100 Cedar Spring Road
Dallas, Texas 75219

North Oak Cliff Branch Library
302 West Tenth Street
Dallas, Texas 75208

Dallas West Branch Library
2332 Singleton Boulevard
Dallas, Texas 75212

An open house for the Lewisville Dam Safety Modifications EA will be held on Tuesday, September 27, 2016, from 6:00 to 8:00 P.M., in the Black Box Theater Room at the Lewisville Grand Theater located at 100 North Charles Street, Lewisville, Texas 75057. Copies of the EA will be available at the meeting for review.

All written comments must be postmarked on or before October 15, 2016. Comments may be submitted in writing to: Marcia Hackett, USACE, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102-0300, or via e-mail to *marcia.r.hackett@usace.army.mil*. Written comments may also be submitted at the public meeting.

Douglas Sims, RPA
Chief, Environmental Compliance Branch

Appendix B

Agency Correspondence

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U. S. Department of Homeland Security
FEMA Region 6
800 North Loop 288
Denton, TX 76209-3698

FEMA

FEDERAL EMERGENCY MANAGEMENT AGENCY
REGION VI
MITIGATION DIVISION

NOTICE REVIEW/ENVIRONMENTAL CONSULTATION

☐ We have no comments to offer. ☒ We offer the following comments:

WE WOULD REQUEST THAT THE LOCAL FLOODPLAIN ADMINISTRATOR BE CONTACTED FOR THE REVIEW AND POSSIBLE PERMIT REQUIREMENTS FOR THIS PROJECT. IF FEDERALLY FUNDED, WE WOULD REQUEST PROJECT TO BE IN COMPLIANCE WITH EO11988 & EO 11990.

Dean Ueckert
Mayor
City of Lewisville
PO Box 299002
Lewisville, TX 75209
dueckert@cityoflewisville.com
972-219-3404

REVIEWER:

Mayra G. Diaz
Floodplain Management and Insurance Branch
Mitigation Division
(940) 898-5541

DATE: August 6, 2013

RECEIVED FRC MAIL ROOM
FEMA, REGION VI

2013 AUG -2 P 3: 23

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

REPLY TO
ATTENTION OF

August 1, 2013

Planning, Environmental
and Regulatory Division

FEMA
Mr. Frank Pagano
FRC 800 North Loop 288
Denton, Texas 76209-3698

Dear Mr. Pagano:

This letter is to notify you that the U.S. Army Corps of Engineers (USACE) Fort Worth District, intends to prepare an Environmental Impact Statement (EIS) for the Dam Safety Modification Study at Lewisville Dam. The Dam Safety Modification Study is being conducted in response to the screening and classification performed in 2005 which identified this project as very high risk because of confirmed and unconfirmed potential safety issues, as well as potential impacts of those issues on the large downstream populations which may be affected. As a result, further analysis and evaluation to confirm safety issues and assess the actual level of risk of those issues are ongoing. While these studies and analyses are being conducted, interim risk reduction measures have been implemented to reduce potential dam safety risks. These interim measures include the installation of filters and monitoring devices, stockpiling materials for use in emergency situations, and increased surveillance of the dam during high flood pool levels. Please see the enclosed USACE Dam Safety Facts for Lewisville Lake Dam for additional information.

The EIS will analyze the potential direct, indirect, and cumulative environmental consequences resulting from the implementation of the project's action alternatives.

Our office is soliciting any input you may have to address concerns regarding the proposed study to assist us as we progress through the National Environmental Policy Act (NEPA) process. Additionally, we would like to invite you to a public scoping meeting addressing the initiation of the environmental and economic analysis associated with the Dam Safety Modification Study. Scoping extends throughout the development of the EIS; however, verbal and written comments received during the meeting and written comments received during the first 30 days after the scoping meetings are more readily useful to the process. The public scoping meeting will occur from 7:00 p.m. to 8:30 p.m. with doors opening at 6:30 p.m. on August 20, 2013, and will be held at the following location:

Medical Center of Lewisville – Grand Theater
Black Box Theater Room
100 North Charles Street
Lewisville, Texas 75057

We look forward to receiving your comments as we move forward. If you are unable to attend the public meeting you may provide scoping comments directly to Ms. Hollie Hunter, ATTN: CESWF-PER-E, P.O. Box 17300, Fort Worth, Texas 76102-0300 or hollie.hunter@usace.army.mil. Thank you for your interest and cooperation.

Sincerely,

E. W. Verwers

Eric W. Verwers
Chief, Planning, Environmental, and
Regulatory Division

Enclosure

US Army Corps of Engineers ®
Fort Worth District

Lewisville Lake Dam Public Scoping Meeting
August 20, 2013

I have the following comments as input for a project report and Draft Environmental Impact Statement concerning dam safety at the Lewisville Lake Dam.

The Upper Trinity Regional Water District in Lewisville, Texas is a stakeholder for the Lewisville Lake Dam projects. The intake structure on the dam is not the ultimate facility and plans are in place for a parallel water line (300mgd). The District respectfully requests that its needs be considered as a stand 'alone' entity since it is ultimately responsible for the water needs of 25 cities in the surrounding area. A copy of the scope, maps, and schedule of any projects related to the dam are requested with as much lead time as possible to provide sufficient time for our planning needs. We also request that cumulative impacts be considered as they relate to future maintenance and projects such as fiber optics. Mr. Taylor is the main point of contact for Upper Trinity, which is the main water supply provider in the area.

Name Karen Menard

Address P.O. Drawer 305, Lewisville, TX 75067
900 N. Kealy, Lewisville, TX 75057

Phone Number (optional) 972.219.1228

Email Address (optional) Kmenard@utrwd.com

Complete this form and return it tonight by placing it in the comment box.
Questions pertaining to the proposed action and DEIS can be addressed to: Ms. Hollie Hunter, Environmental Project Manager, CESWF-PER-EE, U.S. Army Corps of Engineers, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102-0300, (817) 886-1849.

US Army Corps of Engineers ®
Fort Worth District

Lewisville Lake Dam Public Scoping Meeting
August 20, 2013

I have the following comments as input for a project report and Draft Environmental Impact Statement concerning dam safety at the Lewisville Lake Dam.

Need Low water boat ramps — Mel Petty
972 977 3344

Name

Address

Phone Number (optional)

Email Address (optional)

Complete this form and return it tonight by placing it in the comment box.
Questions pertaining to the proposed action and DEIS can be addressed to: Ms. Hollie Hunter, Environmental Project Manager, CESWF-PER-EE, U.S. Army Corps of Engineers, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102-0300, (817) 886-1849.

US Army Corps of Engineers ®
Fort Worth District

Lewisville Lake Dam Public Scoping Meeting
August 20, 2013

I have the following comments as input for a project report and Draft Environmental Impact Statement concerning dam safety at the Lewisville Lake Dam.

• IF, in the unlikely event, the "Required Alternative" selected was Removal of Dam, would the former "Lake Dallas" dam be restored?

• "Pool" = understanding your statement that the Dam currently can't handle a "high" conservation pool, what is the highest safe level you would allow now? Would it be allowed to 'pool' as it did in the 2007 high rains/pool level?

Name

Address

Phone Number (optional)

Email Address (optional)

Complete this form and return it tonight by placing it in the comment box.
Questions pertaining to the proposed action and DEIS can be addressed to: Ms. Hollie Hunter, Environmental Project Manager, CESWF-PER-EE, U.S. Army Corps of Engineers, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102-0300, (817) 886-1849.

January 10, 2014

Ms. Hollie Hunter
CESWF-PER-E
U.S. Army Corps of Engineers
P.O. Box 17300
Fort Worth, TX 76102-0300

RE: Notice of Intent to Prepare Environmental Impact Statement for Dam Safety Modification Study at Lewisville Dam, Denton County
TPWD Project No. 31270

Dear Ms. Hunter:

The Texas Parks and Wildlife Department (TPWD) received notice that the U.S. Army Corps of Engineers (USACE) is soliciting comments for the preparation of an Environmental Impact Statement (EIS) for the Dam Safety Modification Study at Lewisville Dam.

TPWD, as the state agency with primary responsibility for protecting the state's fish and wildlife resources and in accordance with the authority granted by Parks and Wildlife Code §12.0011, hereby provides the following recommendations to minimize the adverse impacts to the state's fish and wildlife resources for the proposed activities.

TPWD Wildlife Habitat Assessment Program is now accepting projects review requests through electronic submittal to WHAB@tpwd.texas.gov. If submitting requests electronically, please include geographic location files when available (e.g. GIS shape file or KMZ file).

Project Description

The proposed project involves evaluating the environmental impacts associated with dam safety modifications which may include potential corrective measures, or a combination thereof, to control seepage, stabilize the embankment, stabilize the spillway, and stabilize the spillway channel at Lewisville Dam. Corrective measures for controlling seepage and stabilizing the embankment may include constructing cutoff walls, incorporating filters, installing toe drains, adding berms, flattening slopes, increasing the embankment cross-section, or a combination of any or all of these measures. The scoping materials indicate that an area of approximately 3,700 acres of USACE property may potentially be impacted by any future dam safety modifications.

Lewisville Lake Environmental Learning Area

A large portion of the potential impact area represents the undeveloped woodland, grassland, and savannah area downstream of the dam that currently serves as the

Lewisville Lake Environmental Learning Area (LLELA). The LLELA is USACE property under a management lease with a consortium consisting of the University of North Texas, Texas A&M University, the City of Lewisville, and the Lewisville Independent School District. The LLELA is a unique property containing approximately 2,000 acres managed to preserve native biodiversity, to restore degraded ecosystems, and to provide educational and scientific use. Situated below the dam and surrounded by urban development, the LLELA comprises undeveloped land consisting of upland and bottomland forests, shrublands, oldfields, streams and wetlands which provide habitat for numerous wildlife.

Recommendation: TPWD recommends the EIS evaluate the potential impacts to habitats of the LLELA as well as the operational and educational impacts to those who utilize the LLELA. TPWD recommends mitigation for actions that impact the LLELA.

Recommendation: If substantial borrow material would be needed for any of the proposed dam modification actions, TPWD recommends the EIS evaluate alternative locations for obtaining borrow, such that impacts to the unique undeveloped habitat below the dam can be avoided and/or minimized.

Recommendation: While still providing acceptable flood protection TPWD recommends identifying and choosing the modification measures with the least amount of temporary and permanent impact to the more mature and diverse forested habitat, streams and wetlands within the project area. Although the Habitat Evaluation Procedures would be followed for evaluating the habitats on site, TPWD recommends that additional professional judgment be utilized when determining project impacts and potential mitigation needs for this unique undeveloped area occurring amongst a large urban area.

Recommendation: TPWD recommends the EIS determine whether any portion of the proposed project would impact Land and Water Conservation Fund or Local Parks Fund projects. A Section 6(f) evaluation would be required when Land and Water Conservation Fund or Local Parks Fund projects would be impacted by the proposed project.

State Fish and Wildlife Resources

State-Listed Threatened and Endangered Species

Section 68.015 of the Parks and Wildlife Code regulates state-listed species. Please note that there is no provision for take (incidental or otherwise) of state-listed species. The *TPWD Guidelines for Protection of State-Listed Species* includes a list of penalties for take of state-listed species (http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/habitat_assessment/media/tpwd_statelisted_species.pdf). For purposes of relocation, surveys, monitoring, and research, handling of terrestrial state-listed species may be permitted through the TPWD Wildlife Permits Office. For the above-listed activities that involve aquatic species please contact the TPWD Kills and Spills Team (KAST) for the appropriate authorization, where applicable. For more information on Wildlife Permits please visit http://www.tpwd.state.tx.us/business/permits/land/wildlife/research/. For more information on KAST please visit http://www.tpwd.state.tx.us/landwater/water/environconcerns/kills_and_spills/regions/.

The TPWD Annotated County Lists of Rare Species are available at http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species/. These lists provide information regarding rare and protected species that have potential to occur within each county. Rare species could potentially be impacted if suitable habitat is present at or near the project site.

> **Recommendation:** TPWD recommends the EIS include individual assessments of the project's potential to impact the State's rare and protected species.

The Texas Natural Diversity Database (TXNDD) is intended to assist users in avoiding harm to rare species or significant ecological features. Given the small proportion of public versus private land in Texas, the TXNDD does not include a representative inventory of rare resources in the state. Please note that absence of information in the database does not imply that a species is absent from that area. Although it is based on the best data available to TPWD regarding rare species, the data from the TXNDD do not provide a definitive statement as to the presence, absence or condition of special species, natural communities, or other significant features within your project area. These data are not inclusive and **cannot be used as presence/absence data**. This information cannot be substituted for on-the-ground surveys. The TXNDD is updated continuously based on new, updated and undigitized records; for questions regarding a record, please contact TexasNatural.DiversityDatabase@tpwd.texas.gov.

The TXNDD revealed a known occurrence of the Pimpleback freshwater mussel (*Quadrula pustulosa*) Element Occurrence (EOID) 9443, a state Species of Greatest Conservation Need (SGCN), in the Elm Fork Trinity River 0.5 mile below the Lewisville Lake dam within the project area of potential impact (see attached map). The TXNDD also revealed a known occurrence of the state-listed threatened Texas heelsplitter (*Potamilus amphichaenus*) EOID 9883 in Lewisville Lake located within the northeast portion of the project area of potential impact. Lastly, the TXNDD revealed known occurrences of the state-listed threatened Louisiana pigtoe (*Pleurobema riddellii*) EOID 9494 and Texas pigtoe (*Fusconaia askewi*) EOIDs 9694 and 9695 in the Elm Fork Trinity River approximately 14 miles downstream of the Lewisville Lake dam.

Recent surveys of sites in the Elm Fork Trinity River in Dallas County have revealed large mussel beds containing native common mussel species as well as state-threatened mussels. These occurrences are an indication that additional areas, yet to be surveyed, may contain important mussel beds. There is a strong likelihood that the project area may contain important aquatic sites containing mussel beds.

Recommendation: TPWD recommends the EIS include an assessment of potential impacts to state-listed and common native freshwater mussels. If state-listed mussels or native mussel beds occur in the project area, then these sites should be considered special aquatic sites for which impacts are avoided or mitigated.

Recommendation: TPWD recommends surveying for mussels in areas of suitable habitat of potentially-impacted waters in the study area. TPWD recommends the USACE conduct mussel surveys in areas where suitable habitat would be temporarily or permanently disturbed as well as in areas that may be impacted by increased sedimentation due to construction activities. TPWD recommends avoiding direct disturbance of habitat and degradation of water quality where native mussels or their habitat are found.

Recommendation: If state-threatened and native common mussels are encountered during surveys, then TPWD recommends USACE incorporate impact avoidance and mitigation measures, such as changes in project design and/or potential mussel relocation and monitoring. Impact avoidance and/or mitigation measures may be needed to minimize the projects impacts on special aquatic sites.

Recommendation: Because the Louisiana pigtoe and Texas heelsplitter (*Potamilus amphichaenus*) have been petitioned for federal listing under the Endangered Species Act, TPWD recommends reporting occurrences of these species to the USFWS-Clear Lake Ecological Services (281) 286-8282 office so that the data can be used toward their determination of a proposed rule for the species.

Rare Resources

In addition to federal- and state-threatened and endangered species, Texas contains over 1,300 species that are considered to be SCGN that, due to limited distributions and/or declining populations, face threat of extirpation or extinction but currently lack the legal protections given to threatened or endangered species. Information regarding SGCN information can be found at http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/texas_rare_species/sgcn/. Special landscape features, natural plant communities, and SGCN are rare resources for which TPWD actively promotes conservation. TPWD considers it important to minimize impacts to special landscape features, natural plant communities, and SGCN to reduce the likelihood of endangerment.

The TXNDD revealed an occurrence of the SGCN Texas garter snake (*Thamnophis sirtails annectens)*, EOID 434 in the vicinity of the project area of potential impact.

Recommendation: TPWD recommends that construction crews be informed of the state-listed species and SGCN with potential to occur in the project area and to take precautions to avoid impacts to such species if encountered during construction activities. TPWD recommends reporting occurrences of state-listed species, SGCN, or other rare resources to TexasNatural.DiversityDatabase@tpwd.texas.gov.

Wetlands

The Waters of the U.S. within the project area are valuable resources, and the value is amplified given that the project area is surrounded by an urban landscape.

Recommendation: TPWD recommends avoiding impacts to water and wetland resources to the extent feasible. TPWD recommends appropriate mitigation be provided to offset wetland losses that may occur as a result of the project, and TPWD expects planning for no net loss of wetlands if impacts to wetland must occur.

Invasive Species

The occurrence of Zebra mussels (*Dreissena polymorpha*) in Lake Lewisville poses a threat to native aquatic resources in the upper Trinity Basin.

Recommendation: TPWD recommends the EIS evaluate the proposed actions with respect to potential spread, control, or treatment of Zebra mussels. The EIS should identify if any of the modifications would reduce or increase the potential for Zebra mussels to spread to downstream waters or inhibit monitoring or control of Zebra mussels.

Recommendation: TPWD recommends following clean, drain, and dry procedures for construction equipment and/or mussel survey equipment that comes into contact with potentially infested waters.

TPWD appreciates the opportunity to provide comments for the pending EIS. If you have any questions, please contact me at (903) 322-5001 or Karen.Hardin@tpwd.texas.gov.

Sincerely,

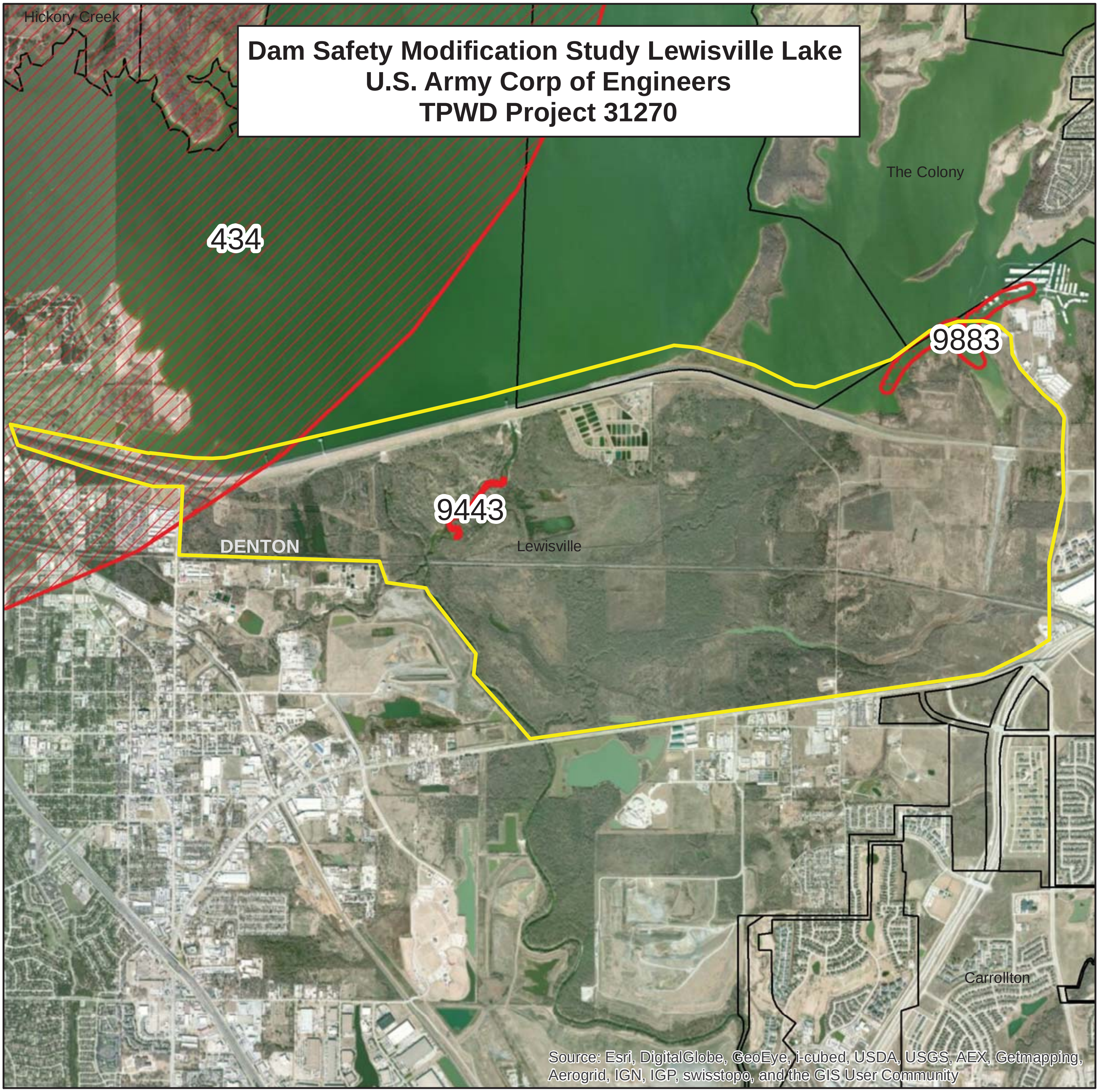
Karen B. Hardin

Karen B. Hardin
Wildlife Habitat Assessment Program
Wildlife Division

kbh/31270

Attachment

Dam Safety Modification Study Lewisville Lake
U.S. Army Corp of Engineers
TPWD Project 31270



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TEXAS PARKS & WILDLIFE
Life's better outside.®

10 January 2014 — 1 in = 0.81 miles

Map compiled by the Texas Parks and Wildlife Department, Wildlife Habitat Assessment Program. No claims are made to the accuracy of the data or to the suitability of the data to a particular use.

Legend

31270_StudyArea

EO Type

- Animal Assemblage
- Invertebrate Animal
- Nonvascular Plant
- Terrestrial Community - Other Classification
- Vascular Plant
- Vertebrate Animal

From:	Edwards, Sean
To:	Mcguire, Amanda SWF
Cc:	melissa_singleton@fws.gov; Hackett, Marcia R SWF; Sims, Douglas C SWF
Subject:	[EXTERNAL] Re: Lewisville Dam Safety Modification PAR
Date:	Friday, June 17, 2016 11:20:48 AM

Mandy,

Thank you again for inviting our input on the Lewisville Dam Safety Modification Planning Aid Report. I believe that it thoroughly address all environmental concerns within the project area and offers generous mitigation for impacts. Therefore, we have no concerns or comments to offer. Missy Singleton of our office did wish to share some further suggestions regarding the seed list targeting pollinators but she is unavailable until Monday due to an unexpected event. If that input is still acceptable on Monday we'd like to share it.

Kind Regards,

Sean Edwards
Biologist - Environmental Review, Classification & Recovery
U.S. Fish & Wildlife Service
2005 NE Green Oaks Blvd., Ste 140
Arlington, Texas 76006
(817) 277-1100

On Fri, Jun 10, 2016 at 3:12 PM, Mcguire, Amanda SWF <Amanda.Mcguire@usace.army.mil <mailto:Amanda.Mcguire@usace.army.mil> > wrote:

Sean/Missy,

Please find attached the Lewisville Dam Safety Modification Planning Aid Report for your review. As discussed earlier this week, we are more than willing to discuss any revisions/comments with you next week at your office if necessary. In order to maintain schedule, the USACE goal is to have an email of support/concurrence by Friday, June 17 if at all possible. Please let us know if you need anything from us and we will be happy to answer questions or help in any way we can. Again, thank you for your help on this project.

Thanks,
Mandy

Mandy McGuire
Regional Technical Specialist
Coastal Section, Environmental Compliance Branch
Regional Planning and Environmental Center
Office: 817-886-1864
Cell: 817-504-9186

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

June 23, 2016

Mark Wolfe
Executive Director
Texas Historical Commission
1511 Colorado St.
Austin, TX 78701

RECEIVED
JUN 27 2016
Texas Historical Commission

Dear Mr Wolfe,

The U.S. Army Corps of Engineers (USACE) is currently conducting a Lewisville Dam Safety Modification Study. Lewisville Dam is USACE owned and operated and is used for flood risk management, recreation, water allocation and non-federal hydropower. The study addresses seepage through the dam's earthen embankment and ensures continued stability and performance of infrastructure associated with the dam.

The attached Architectural Cultural Resource Analysis discusses the undertaking, defines the Area of Potential Effect (APE), identifies resources within the APE, evaluates them for eligibility for the National Register of Historic Places and determines the effect of the undertaking on eligible architectural resources. One property, Ritter Cemetery, was determined eligible and it was further determined the undertaking has no adverse effect.

We seek your concurrence on the findings in the attached report. Impacts to archeological resources have been coordinated separately with your office in a letter dated 22 March 2016.

If you have questions or comments, please contact Joseph Murphey, Historic Architect, 817-229-1956, or via email at joseph.s.murphey@usace.army.mil.

CONCUR
by William A. Martin
for Mark Wolfe
State Historic Preservation Officer
Date 7/7/16
Track#

Enclosure

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

June 27, 2016

Mr. Mark Wolfe, Executive Director
Texas Historical Commission
1511 Colorado
Austin, TX 78701

Dear Mr. Wolfe,

The U.S. Army Corps of Engineers, Fort Worth District (USACE) is conducting a dam safety modification study at Lewisville Dam in Denton County, Texas. This project will address seepage through the dam's earthen embankment, and ensure continued stability and performance of the infrastructure associated with the dam.

The modification involves several repairs on the earthen embankment and concrete spillway, to include two staging areas (35 acres) and two borrow areas (90 acres), all limited to the dam's current footprint. A cultural resource investigation for this dam safety modification was conducted by USACE contractor, Cardno Tec-GMI Joint Venture. With THC concurrence on the work plan, investigations included pedestrian survey and trenching in the borrow areas as well as pedestrian survey and shovel testing in the staging areas. Cultural resource investigations of both the borrow area and staging locations revealed no archeological sites; therefore, USACE has determined that No Historic Properties will be affected by the proposed activities.

As continued coordination for this project, a copy of the draft report entitled *Cultural Resources Investigations, the Lewisville Dam Safety Modification Study* is enclosed for your review and comment.

We ask for your concurrence with these determinations and welcome your comments on the enclosed draft report. If you have questions or concerns, please contact Ms. Rebekah Sease, Archeologist, at 817.886.1470, or via email at rebekah.sease@usace.army.mil.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

Enclosure

NO HISTORIC
PROPERTIES AFFECTED
PROJECT MAY PROCEED
by
for Mark Wolfe
State Historic Preservation Officer
Date 7/29/16
Track# 201609158

DRAFT REPORT ACCEPTABLE

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Comanche Nation
Mr. James Aterberry
Comanche Nation
584 NW Bingo Road
HC 32 Box 908
Lawton, Oklahoma 73502

Dear Mr. Aterberry:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the Council on Environmental Quality Code of Federal Regulations (CFR) (40 CFR parts 1500-1508), and USACE Engineering Regulation 200-2-2 by the USACE Fort Worth District.

The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address identified deficiencies. Under the proposed action, the USACE would reduce risk of dam failure from seepage deficiencies at two different locations by constructing downstream inverted filter berms with associated collection trenches for seepage flow at each location. The USACE would reduce the risk of dam failure associate with spillway instability by construction post-tensioned anchors with an upstream geomembrane cutoff to support the spillway structure, and overlay the apron on the downstream side of the spillway to prevent the apron panels from moving during spillway flow events. All the construction activities associated with the proposed action would be conducted on Lewisville Lake federal project lands.

An open house for the Lewisville Dam Safety Modifications EA will be held on Tuesday, September 27, 2016, from 6:00 to 8:00 P.M., in the Black Box Theater Room at the Lewisville Grand Theater located at 100 North Charles Street, Lewisville, Texas 75057.

A Notice of Availability (NOA) has been prepared to notify the public of this action and to solicit comments on the EA and draft FONSI. The NOA and EA with draft FONSI

are enclosed with this communication for your review and to solicit any comments or concerns the Comanche Nation may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Environmental Protection Agency, Region 6
Ms. Rhonda Smith
Chief, Planning and Coordination Section
1445 Ross Avenue, Suite 1200
Mail Code: 6EN-XP
Dallas, Texas 75202

Dear Ms. Smith:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Environmental Protection Agency may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Federal Aviation Administration
Southwest Region
Mr. Michael O'Harra
Regional Administrator
2601 Meacham Boulevard
Fort Worth, Texas 76137

Dear Mr. O'Harra:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Federal Aviation Administration may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Caddo Nation of Oklahoma
Honorable Tamara Francis-Fourkiller
Chairperson
507 NE 1 or 5 Miles West of City
Binger, Oklahoma 73009

Dear Chairperson Francis-Fourkiller:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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A Notice of Availability (NOA) has been prepared to notify the public of this action and to solicit comments on the EA and draft FONSI. The NOA and EA with draft FONSI

are enclosed with this communication for your review and to solicit any comments or concerns the Caddo Nation of Oklahoma may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Kiowa Tribe of Oklahoma
Honorable Amber Toppah
Chairman
Highway 9 West
Carnegie, Oklahoma 73015

Dear Chairman Toppah:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Kiowa Tribe of Oklahoma may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Texas Commission on Environmental Quality
Air Quality Division
Holly Ferguson, Natural Resource Specialist
Building F, 12100 Park 35 Circle, MC-206
Austin, Texas 78753

Dear Ms. Ferguson:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Air Quality Division of the Texas Commission on Environmental Quality may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Texas Commission on Environmental Quality
Standards Implementation Team – Water Quality Division
Gregg Easley, Team Leader
Building F, 12100 Park 35 Circle, MC-150
Austin, Texas 78753

Dear Mr. Easley:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Water Quality Division of the Texas Commission on Environmental Quality may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Texas Historical Commission
Mr. Mark Wolfe
Executive Director
1511 Colorado Street
Austin, Texas 78701

Dear Mr. Wolfe:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Texas Historical Commission may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Texas Parks and Wildlife Department
Ms. Julie Wicker
Wildlife Habitat Assessment Program Leader
4200 Smith School Road
Austin, Texas 78744-3291

Dear Ms. Wicker:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Texas Parks and Wildlife Department's Wildlife Habitat Assessment Program may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Texas Parks and Wildlife Department
Mr. Tom Heger
Resource Protection Division, Wetlands Coordinator
4200 Smith School Road
Austin, Texas 78744-3291

Dear Mr. Heger:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the Texas Parks and Wildlife Department's Resources Protection Division may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

U.S. Fish and Wildlife
Arlington Ecological Services Field Office
Ms. Debra Bills, Field Supervisor
2005 NE Green Oaks Boulevard, Suite 140
Arlington, Texas 76006

Dear Ms. Bills:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

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are enclosed with this communication for your review and to solicit any comments or concerns the U.S. Fish and Wildlife Service may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

September 16, 2016

Wichita Executive Committee
Honorable Terri Parton
President
1 ¼ miles North on Highway 281
Anadarko, Oklahoma 73005

Dear President Parton:

The United States Army Corps of Engineers (USACE) is seeking comments on the enclosed Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) assessing the potential environmental consequences resulting from implementation of proposed dam safety modifications to the Lewisville Dam on the Elm Fork of the Trinity River in Lewisville, Texas. The purpose of the proposed action is to minimize the potential for dam failure by addressing deficiencies at the Lewisville Dam. The proposed action is needed for the Lewisville Dam to meet USACE risk reduction guidelines for existing dams and to provide the benefits for which it was authorized.

This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the Council on Environmental Quality Code of Federal Regulations (CFR) (40 CFR parts 1500-1508), and USACE Engineering Regulation 200-2-2 by the USACE Fort Worth District.

The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address identified deficiencies. Under the proposed action, the USACE would reduce risk of dam failure from seepage deficiencies at two different locations by constructing downstream inverted filter berms with associated collection trenches for seepage flow at each location. The USACE would reduce the risk of dam failure associate with spillway instability by construction post-tensioned anchors with an upstream geomembrane cutoff to support the spillway structure, and overlay the apron on the downstream side of the spillway to prevent the apron panels from moving during spillway flow events. All the construction activities associated with the proposed action would be conducted on Lewisville Lake federal project lands.

An open house for the Lewisville Dam Safety Modifications EA will be held on Tuesday, September 27, 2016, from 6:00 to 8:00 P.M., in the Black Box Theater Room at the Lewisville Grand Theater located at 100 North Charles Street, Lewisville, Texas 75057.

A Notice of Availability (NOA) has been prepared to notify the public of this action and to solicit comments on the EA and draft FONSI. The NOA and EA with draft FONSI

are enclosed with this communication for your review and to solicit any comments or concerns the Wichita Executive Committee may have regarding this action. We will consider any comments that we receive from your office by the close of the comment period, October 15, 2016. Please address any requests or comments using the contact information indicated in the NOA. Thank you for your cooperation in this matter.

Sincerely,

Douglas Sims, RPA
Chief, Environmental Compliance Branch

Appendix C

2016 Planning Aid Report

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Draft

U.S. FISH AND WILDLIFE SERVICE HABITAT CONDITIONS PLANNING AID REPORT FOR THE LEWISVILLE DAM SAFETY MODIFICATION PROJECT DENTON COUNTY, TEXAS

JUNE 2016

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EXECUTIVE SUMMARY

This planning aid report (PAR) describes fish and wildlife resources within the Lewisville Dam Safety Modification Project study area in Denton County, Texas, and is intended to assist the United States (U.S.) Army Corps of Engineers (USACE) in their planning efforts for the associated Environmental Assessment (EA).

USACE's Fort Worth District, Trinity Region, has initiated preparation of a Dam Safety Evaluation Study to plan and evaluate options available for safety-related modifications to Lewisville Dam, Denton County, Texas. From the Interim Risk Reduction Measures Plan, Lewisville Dam, Texas, dated 28 December 2009, several potential problems were identified related to dam safety that were addressed more specifically during studies conducted in 2010 and 2013. Areas of concern were identified along seepage/stability areas, and with potential instability of the weir and apron at the spillway. In order to address these concerns, USACE is proposing to implement modifications that would reduce underseepage at two locations, reduce erosion along the outfall structure, and improve stability at the spillway. In order to implement these modifications, USACE would require geotechnically-appropriate fill for use at the embankment. To this end, two potential borrow areas have been identified adjacent to the Lewisville Dam. USACE is also proposing habitat measures in the borrow areas after the sites are no longer needed for borrow/fill. These measures would establish savanna habitat for long-term maintenance with the aim of providing quality habitat for regional pollinators, especially the monarch butterflies that migrate along Interstate 35.

The region of influence (ROI), or project area, includes 3,498.8 acres of land, 215.6 acres of which are already developed. The 3,283.2 undeveloped acres consist of two aquatic and five terrestrial habitat types for biological resources: lacustrine (43.7 acres), riverine (25.0 acres), riparian woodland (302.2 acres), upland forest (1197.7 acres), wetland (117.8 acres), grassland (594.4 acres), and savanna (1,002.4 acres). Within the project area, the action area, i.e., the area subject to disturbance by the Proposed Action, encompasses a total of 291.2 acres and includes 17.7 acres of lacustrine habitat, 0.5 acre of riverine habitat, 7.6 acres of riparian woodlands, 48.1 acres of upland forest, 0.3 acres of wetland habitat, 77.2 acres of grassland, and 114.7 acres of savanna. The action area also includes 25.1 acres of urban area; these areas were excluded from the habitat suitability analysis.

In June 2011, the U.S. Fish and Wildlife Service (USFWS) submitted a Planning Aid Letter (PAL) to USACE that described the existing fish and wildlife resources within the Lewisville Lake Dam Safety Modifications USACE property study area in Denton County, Texas using the Habitat Evaluation Procedures (HEP). Since that time, USACE conducted an additional HEP Study in October 2013. This study revisited the original 20 HEP data collection sites as well as visited an additional 60 sites in order to analyze a more robust sample of the habitats present. Also in 2013, USACE commissioned the USFWS to conduct an aquatic Index of Biotic Integrity (IBI) Study. Results and discussion of the 2013 follow-up HEP and IBI Studies were discussed in an updated version of the PAL submitted in 2014. USFWS and USACE personnel cooperated in collecting the habitat field data required to complete this report. The data collected from the 80 sites visited in 2013 along with the analyses in the 2014 PAL served to inform the analysis in this report.

In preparation of this report, USACE mapping was utilized to identify and update vegetation cover types and distribution, and perform habitat evaluations of each cover type using the USFWS's HEP.

To varying degrees, most of the study area has been subjected to past and/or ongoing human disturbance from nearby commercial and residential activities, recent long-term cattle grazing, automotive traffic, recreational activities, runoff of pollutants, etc. Wildlife habitat quality appears to vary throughout the area investigated. Areas subjected to less frequent impact appear to contain reasonably intact riparian forested patches and upland grasslands. These and other areas removed from permanent urbanized development are most likely to benefit from preservation and restoration efforts to improve habitat diversity and quality, while promoting a variety of resident and migratory wildlife species.

Due to the character and quality of the habitats observed within the project area, it is unlikely that any federally listed threatened or endangered species would be present; however, there is suitable habitat for special status species within the area. There is also potential for some special status bird species as well as neotropical migrant songbirds to transit the ROI, using the grassland, bottomland hardwood, wetland, and riverine habitats for resting and feeding during migration. Several federal- species have the potential to be found in and around the Project Area. Per the USFWS Information for Planning and Conservation Report, two endangered birds, the least tern (*Sterna antillarum*) and the whooping crane (*Grus americana*) have the potential to occur and be affected by the Proposed Action Alternative. Nineteen species of birds listed as Birds of Conservation Concern by the USFWS may occur within the general vicinity of ROI.

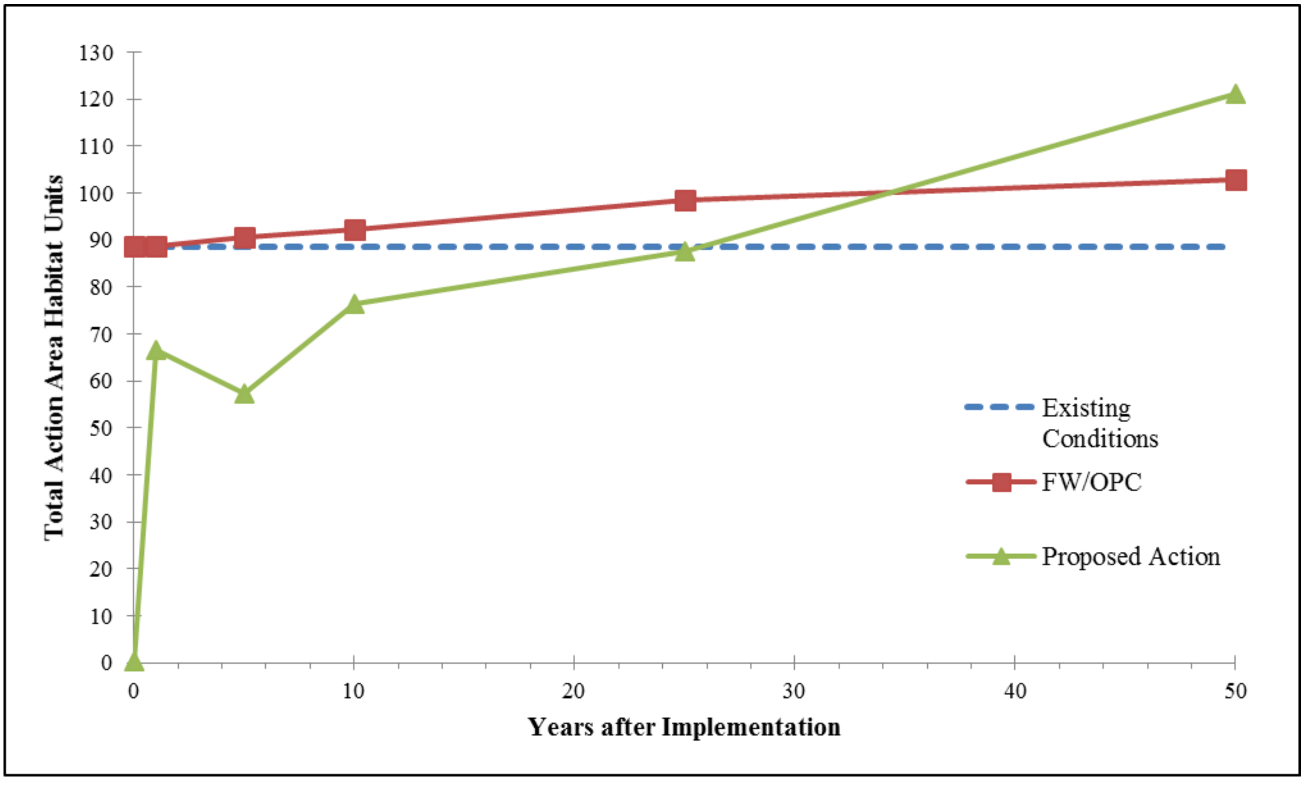
As shown in Table ES-1, habitat units (HUs) would decrease for savanna under the Future without Project Condition, but would substantially increase under the Proposed Action. Upland forest and grassland habitats would improve under both alternatives, with substantially larger increases for upland forest under the Future without Project Condition as compared to the Proposed Action. There is no difference in the projected HUs for aquatic riverine habitat or wetland habitat.

Table ES-1. Comparison of Habitat Units at Year 50 for All Alternatives

Habitat Type	*Existing Conditions*	*Future without Project Condition*		*Proposed Action Alternative*	
	HU	*HU*	*Difference*	*HU*	*Difference*
Riparian Woodland	3.42	4.41	0.99	0.00	-3.42
Upland Forest	14.43	42.52	28.09	21.32	6.89
Wetland	0.06	0.06	0.00	0.06	0.00
Grassland	37.06	37.83	0.77	41.37	4.31
Savanna – Habitat Measures	33.26	17.52	-15.74	52.22	52.22
Savanna – All Others	0	0	0	5.73	-27.53
Aquatic Riverine	0.43	0.44	0.01	0.44	0.01
Total	**88.66**	**102.78**	**14.12**	**121.14**	**32.48**

Chart ES-1 presents all the HUs combined over time. The Proposed Action would have short-term impacts to habitat. However, habitat improvements would develop over time under the Proposed Action, especially in rapidly recovering grasslands and savanna. These HUs would increase the most from Year 0 to 10 due to the rapid growth of most grassland and savanna vegetation.

Chart ES-1. Change in Combined Habitat Units under All Alternatives



One of the primary goals of proposed habitat measures is to establish savanna habitat that supports a robust, resilient, and diverse pollinator community. Elements of the habitat measures, such as planting of flowering shrubs and choice of specific, pollinator-favored herbaceous vegetation, are not captured by HEP modelling, but still provide substantial increased to habitat health over all. Furthermore, the tree species proposed for planting in the savanna mottes are generally slow growing and would likely take more than 50 years to reach functional maturity and mast production. Thus, it is likely that habitat values would continue to improve beyond 50 years, in addition to continuing to provide an oasis of quality pollinator habitat in a highly developed region.

ACKNOWLEDGEMENTS

The Fort Worth District's Regional Planning and Environmental Center (RPEC) provided the USFWS the information necessary for completing this report. Daniel Allen and Mandy McGuire, Environmental Planners with the RPEC, assisted with field work, reviewed data, and provided essential information. Marcia Hackett, RPEC Regional Technical Specialist and Lewisville Dam Safety Modification EA Environmental Lead, also reviewed data and provided information critical to completing this document. Additional support was provided from the USACE Operations personnel, Trinity Regional Office, as well as personnel from Texas Parks and Wildlife Department.

Several USFWS biologists assisted with this report. Sean Edwards served as lead Biologist for this study between 2009 and 2016, organized and led the field work, and completed preliminary data computation. Jacob Lewis was the lead for the IBI portion of this study. Debra Bills, Field Supervisor, reviewed and provided guidance necessary to complete this report. Additional

Dr. Mike Dungan, Blake Claypool, Lorraine Shaughnessy, Erica Boulanger, Jason Harshman, and Shannon Brown of Cardno provided support critical to completing this document.

Draft
U.S. FISH AND WILDLIFE SERVICE HABITAT CONDITIONS PLANNING AID REPORT FOR THE LEWISVILLE DAM PROJECT

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Acronyms and Abbreviations

%	percent
BCC	Birds of Conservation Concern
dbh	diameter at breast height
EA	Environmental Assessment
°F	degree Fahrenheit
FW/OPC	Future without Project Condition
HEP	Habitat Evaluation Procedures
HSI	habitat suitability index
HU	habitat unit
IBI	Index of Biotic Integrity
IPaC	Information for Planning and Conservation
LLELA	Lewisville Lake Environmental Learning Area
msl	mean sea level
PAL	Planning Aid Letter
PAR	Planning Aid Report
PFMs	potential failure modes
PFMA	Potential Failure Mode Analysis
RPEC	Regional Planning and Environmental Center
ROI	region of influence
TPWD	Texas Parks and Wildlife Department
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

CHAPTER 1
PROJECT OVERVIEW

1.1 INTRODUCTION

In 2011, the United States (U.S.) Fish and Wildlife Service (USFWS) carried out a Habitat Evaluation Procedures (HEP) analysis and submitted the Existing Habitat Conditions for the Lewisville Dam Safety Evaluation Study, Denton County, Texas Supplemental Planning Aid Letter (PAL) to the U.S. Army Corps of Engineers (USACE) (2011 PAL). USACE conducted an additional HEP Study in October 2013. This study revisited the original 20 HEP data collection sites as well as visited an additional 60 sites in order to analyze a more robust sample of the habitats present. USACE also commissioned the USFWS to conduct an aquatic Index of Biological Integrity (IBI) Study. Results and discussion of the 2013 follow-up HEP and IBI Studies were discussed in an updated version of the PAL submitted in 2014 (2014 PAL). The 2014 PAL presented current habitat conditions within the Region of Influence (ROI) for the Proposed Action. In addition, the 2014 PAL projected the future conditions within the ROI if the Proposed Action were not implemented. This Planning Aid Report (PAR) further supplements the earlier efforts, and includes a description of the Proposed Action as well as a discussion of the impacts anticipated from that action. Figure 1-1 displays the overall project area, as well as the habitat types and survey sites associated with the earlier HEP data collection efforts.

The PAR outline is provided below.

- Chapter 1
    - Project Overview
    - Project Description and Purpose
    - Project and Action Area
- Chapter 2
    - Habitat Evaluation Method
    - Habitat Descriptions
    - Habitat Unit Summary
    - Threatened and Endangered Species
    - Recommendations
    - Summary
- Chapter 3 presents the impacts to habitats and habitat value from implementation of the Future Without Project Condition.
- Chapter 4 presents the impacts to habitats and habitat value from implementation of the Proposed Action alternative.
- Chapter 5 presents a summary of the different habitats and habitat value changes over time among the two alternatives.
- Chapter 6 presents the references.

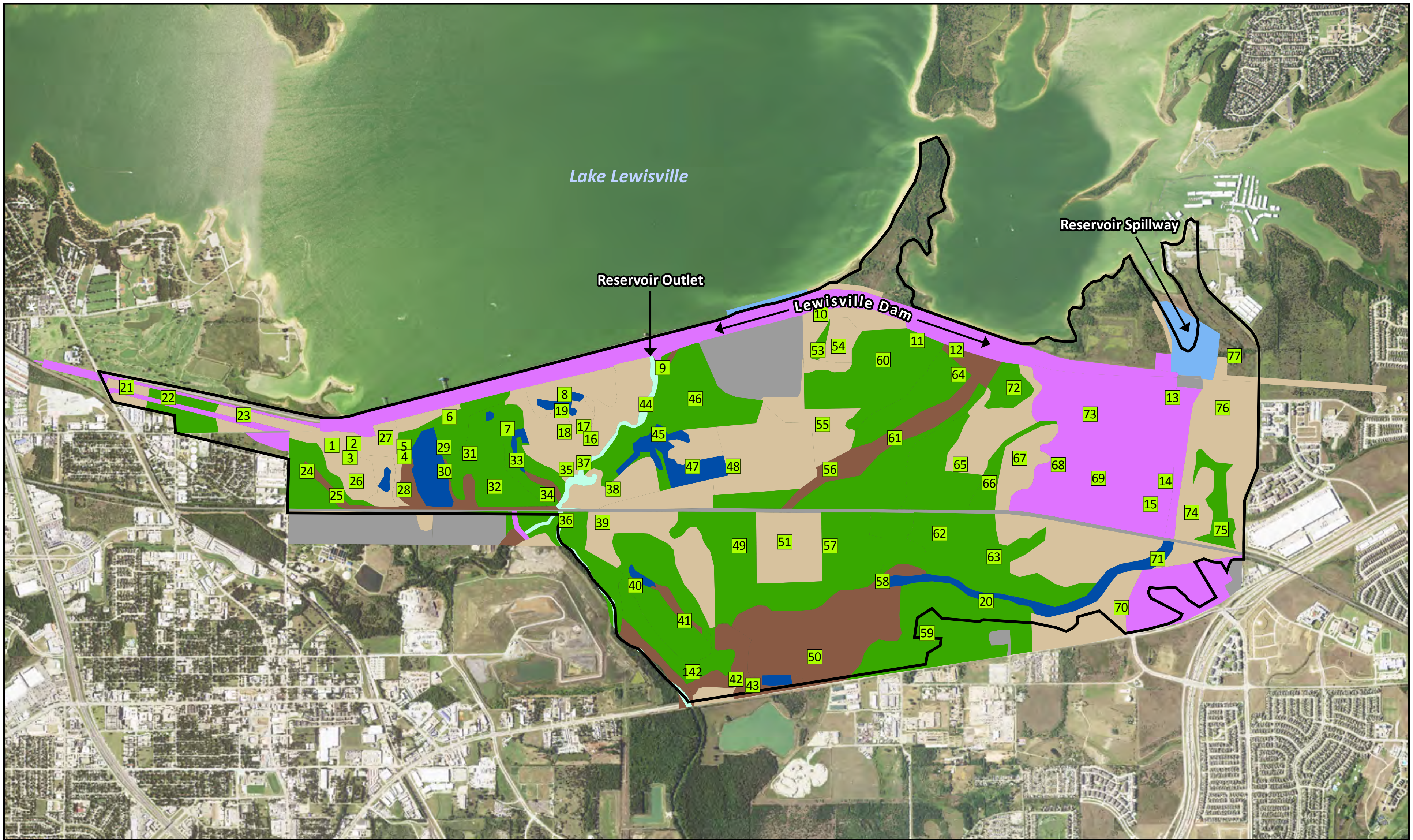

Figure 1-1. Lewisville Dam Safety Modifications Project Area, Cover Types, and 2013 HEP Sites

1.2 PURPOSE/PROJECT DESCRIPTION

The purpose of the Proposed Action is to remediate the conditions at the Lewisville Lake Dam that currently threaten dam stability. These deficiencies include seepage flow under the dam, spillway weir instability, and apron instability at the spillway. The Proposed Action is needed to establish the Lewisville Dam as a safe facility that meets USACE risk reduction guidelines for existing dams and allows the project to provide the benefits for which it was authorized. Figure 1-2 displays the habitats present in the project area, as well as the major features of the Lewisville Dam.

A Potential Failure Mode (PFM) Analysis (PFMA) of the Lewisville Dam was conducted on 23 through 27 February 2009 at the Trinity Regional Project Office in Lewisville. The intent of the PFMA was to identify the PFMs that were considered to be credible and significant (risk-drivers) or considered to be a significant contributor to the dam’s overall risk. Twenty-three total PFMs were identified in the course of the analysis; three of those (PFM 4, 6, and 7) were determined to be the primary risk factors driving risk.

USACE developed eight alternative approaches to reduce risk for each of the risk-driving PFMs. In the course of developing risk reduction alternatives, USACE determined that any treatment addressing PFMs 4, 6, and 7 could be efficiently and effectively expanded to also address PFMs 2 and 8. While these PFMs are not risk-driving, they are identified risks, and the USACE elected to continue analysis with these PFMs included. After analysis of quantified risk reduction, USACE identified a Proposed Action alternative to carry forward for detailed analysis.

1.2.1 PFM 2

PFM 2 refers to the risk associated with internal erosion of the Lewisville Dam embankment along the outlet conduit (Figure 1-2). There are no indications of any near-term concerns at the conduit, so the probability is remote. However, the consequences would be high if failure were to occur. The risk associated with this PFM is relatively low, but measures to address it are included to take advantage of construction and design efficiencies.

This measure would surround the existing conduit with a fine horizontal filter and two outlets on each side. The filter would extend approximately 50 feet upstream of the conduit. The fine filter would extend downstream along both sides of the basin wall and convert to a two-stage filter along the weep holes in the basin walls. The two-stage filter would allow the weep holes to discharge any collected seepage and prevent the piping of the fine filter through the weep holes.

1.2.2 PFM 4A

PFM 4 generally refers to the risks associated with water seeping under the embankment, which could result in internal erosion of foundation along sand zones located in the foundation if not effectively monitored and controlled. When seepage in the sandy alluvial foundation materials is uncontrolled, backwards erosion/piping of the foundation may result. Erosion and piping result in the loss of embankment materials, which then causes instability of the embankment toe, increasing the exit flow and allowing for gross enlargement of the unfiltered pipe exit.

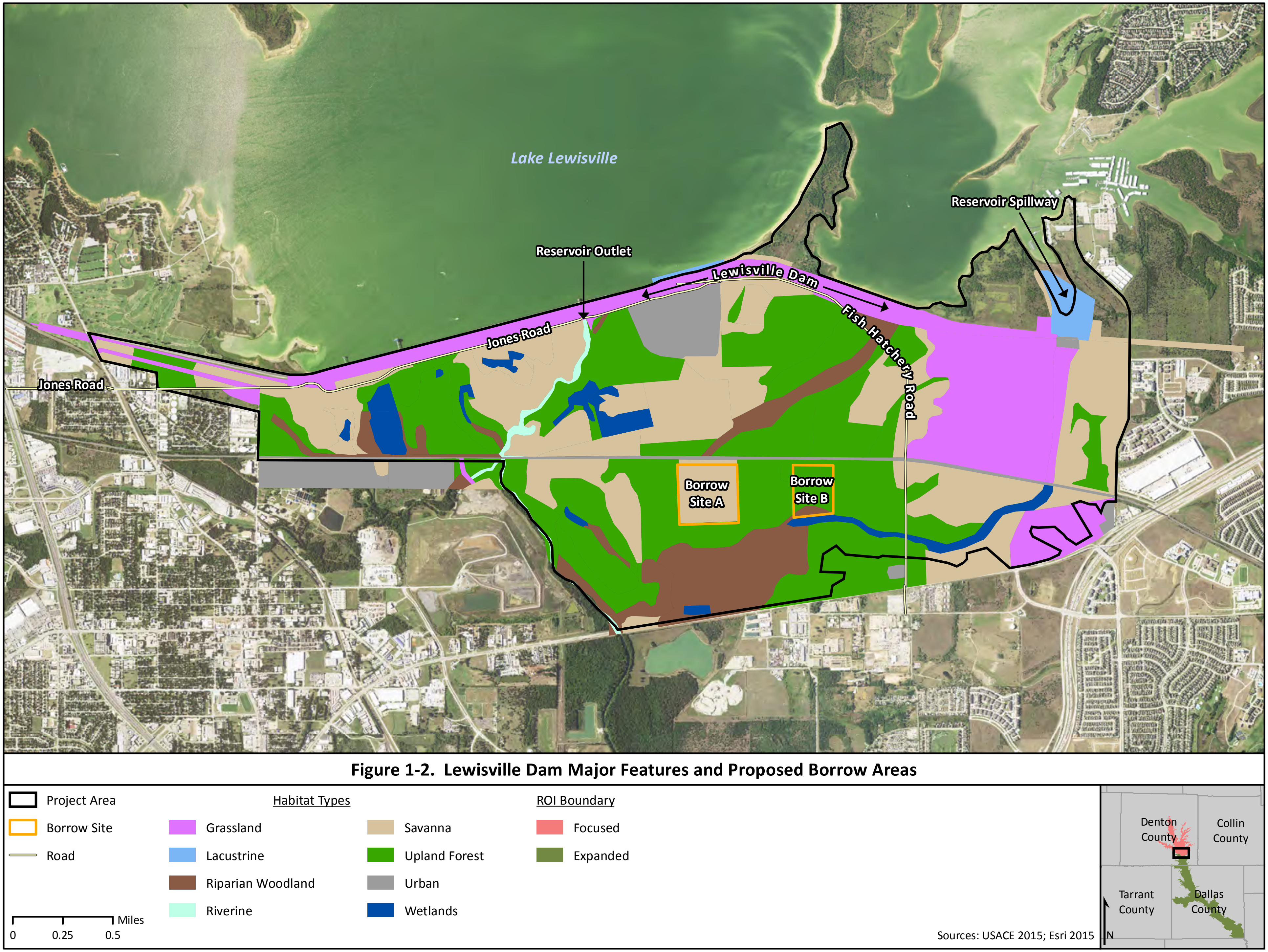

Figure 1-2. Lewisville Dam Major Features and Proposed Borrow Areas

PFM 4A refers specifically to the seepage occurring at "Seepage Area 1." This seepage carries a moderate to low probability of internal erosion and piping from high seepage volumes but because the consequences associated with this PFM are very high, the overall risk is considered high. PFM 4A is a risk-driving measure for the Proposed Action.

The proposed treatments at PFM 4A include the construction of a trapezoidal collection trench and an inverted filter berm at Seepage Area 1. The collection trench would be approximately 400 feet long, and would be near the toe of the inverted filter berm that is included in this measure. The collection trench would intersect the sand strata along its length. The collection trench would outflow into a weir box and then flow on the surface until it reaches the stream southeast of the seepage area. The inverted filter berm would consist of a fine and course filter section at the base of the berm. The remainder of the berm would consist of fill obtained from the borrow areas. The berm length would be around 400 feet and the width extends approximately 160 feet downstream. The berm would add stability to the embankment and would cover existing cracks and holes. At completion, the berm would be seeded with native grass seeds, and future maintenance would include regular mowing of vegetation.

Dewatering would be required for this construction. Two City of Lewisville water supply lines would have to be relocated prior to the beginning of the construction. This relocation has been incorporated into the Proposed Action.

1.2.3 PFM 4B

PFM 4B refers specifically to the seepage occurring at "Seepage Area 2." This seepage carries a low to remote probability of internal erosion and piping from high seepage volumes at extreme events, but because the consequences associated with this PFM are very high, the overall risk is considered moderate to high. PFM 4B is a risk-driving measure for the Proposed Action.

This measure would consist of a trapezoidal trench approximately 1,200-feet long. The collection trench would be in the existing drainage ditch just south of the toe road. The collection trench would intersect the sand strata along its length. A berm would also be constructed along the length of the collection trench and extend downstream. The berm would have filter material at the base and would have a sloping top. A parabolic drainage ditch would be included downstream of the toe of the berm. The measure would require rerouting of utilities (communications, electric, municipal, and raw water) that currently serve on-site facilities.

1.2.4 PFM 6

PFM 6 refers to the spillway weir (refer to Figure 1-2) sliding on its foundation. When the spillway experiences strong uplift pressures from extreme pool levels, the existing instability may lead to sliding and breach of the weir. The uplift pressures acting on weir structures initiate progressive failure of spillway components and the underlying foundation materials. The probability for extreme events seen only under modeling conditions is high, and lowers as elevations reach those associated with actual pool elevations. The consequences associated with this PFM are high. The resulting risk is considered high. PFM 6 is a risk-driving measure for the Proposed Action.

This measure would consist of installing an upstream geomembrane blanket in the approach channel of the spillway. The geomembrane would be installed approximately 3 feet below the current grade and attached to the monoliths. The membrane would extend upstream approximately 40 feet and would be covered with the material removed for its installation. The weir monoliths would be stabilized with post-tensioned anchors with an upstream inclination. The depth of the anchors is currently estimated at 70 feet. A field testing program is planned to further refine the design parameters for the anchors. A work platform or rail system would be required to install the anchors along the downstream slope of the monoliths. Piezometers would also be installed through the monoliths to monitor pore pressures.

1.2.5 PFM 7

PFM 7 refers to the spillway weir instability due to spillway apron failure during high velocities and high stagnation pressure in the existing offset joints in the apron slabs leads to undermining and sliding of the spillway weir, resulting in loss of pool. Stagnation pressures fail successive apron slabs to initiate a progressive failure of spillway components and the underlying foundation materials. The probability for extreme events seen only under modeling conditions is moderate, and lowers as elevations reach those associated with actual pool elevations. The consequences associated with this PFM are high. The resulting risk is considered high.

This measure would include installing apron slabs over the existing apron slabs. A drainage layer would be included between the two slabs. The drain holes in the existing slabs would be filled with filter material to provide an outlet for seepage under the slabs. The drains would outlet through the endcap at the downstream edge of the slabs. The overlay slabs would be 40 feet by 40 feet and would be either keyed or doweled together. Each overlay slab would have nine evenly spaced anchors. A 30-foot turndown would be installed at the end of the apron slabs to provide protection against the degradation of the outlet channel. The measure includes a 2-foot vertical extension of the training walls to account for the freeboard needed from the probable maximum flood event.

1.2.6 PFM 8

PFM 8 refers to the instability of the upstream embankment slope contributing to a risk of slope failure that would lower the top of dam at the site of the slide. The probability associated with this PFM is remote, but measures to address it are included to take advantage of construction and design efficiencies, since consequences would be moderate to high.

This measure would consist of installing an upstream embankment berm on parts of the embankment. The crest modification would occur along the same embankment.

The embankment berm would be constructed to an elevation of 537.0 with a 15-foot top width and 4:1 upstream slope. The embankment berm would have rock riprap protection on the upstream slope to protect against wave erosion. The fill for the embankment berm would come from the proposed borrow locations. Additional analysis would be completed to determine the need for lime treatment of this material. The crest modification would include removing the existing pavement and removal of approximately 6 feet of the embankment. The material from the embankment would be lime treated and replaced. The crest would be sloped to the downstream and a geomembrane added prior to repaving the crest road. Further analysis would determine the depths of the existing embankment that would receive the lime treatment.

1.2.7 Ancillary Features

In addition to these PFM treatments, several ancillary actions are anticipated, including access roads, utility relocation, and establishment of borrow and staging areas. Two borrow areas, referred to as Borrow Area A (56.4 acres) and Borrow Area B (32.1 acres) have been identified. The borrow areas were sited with input from the management of the Lewisville Lake Environmental Learning Area (LLELA) to minimize environmental and recreational impact. The borrow areas are shown on Figure 1-2. The borrow areas currently reflect the maximum area needed for borrow. It is possible that in the course of project design, less borrow would be needed and the disturbed area could be smaller than that considered here. For the purposes of this analysis, however, the most impactful condition, i.e., with both borrow pits being fully utilized, is considered.

Lastly, as part of operations and maintenance, a 50-foot “vegetation clear zone” would be re-established along the toe of the embankment. Utility relocations and the access road are being designed to fall within the clear zone.

1.2.8 Habitat Measures

After the dam safety measures have been implemented, USACE would contour the borrow areas to resemble the natural surrounding terrain, and seed and plant trees on the disturbed land. The plantings would be intended to create a landscape more consistent with historic prairie and upland forest conditions, as well as to foster habitat useable for the pollinators on which the habitat depends. The borrow pit planting would aim to establish healthy, native savanna conducive to pollinator health and establishment. Savanna development in the borrow pits would be planted with native herbaceous vegetation, with a substantial milkweed component.

Planting would be guided by the *Ecosystem-based Vegetation Management Prescriptions for Federally-owned Land at Grapevine and Lewisville Lakes* (USACE 2004) (“Management Prescriptions”), USACE Pollinator Enhancement Plan (USACE 2005) and the *National Strategy to Promote the Health of Honey Bees and other Pollinators* (Pollinator Health Task Force 2015), and would use native species as identified in Table 1-1. Shrubs and trees would be planted at a density of up to 20 shrubs per acre and 20 trees per acre. Trees and shrubs would be containerized plants up to one- to two-inch diameter at breast height (dbh), or one- to two- years old. The tree and shrub species would be planted in motted to replicate savanna-type habitat interspersed with grasslands. The mottes would be planted across the landscape, according to their tolerance for hydric conditions, and commercial availability from year to year. Planting and subsequent adaptive management, monitoring, and maintenance would be done in partnership with LLELA and the USACE-run Lewisville Aquatic Ecosystem Research Facility. It is anticipated that adaptive management and monitoring would occur for up to three years after implementation. Management of the site could include various management measures including, but not limited to, prescribed burns and grazing.

Table 1-1. Suggested Tree, Shrub, and Grass Plantings

Common Name	*Scientific Name*	*Common Name*	*Scientific Name*
Trees		**Forbs**	
Pecan	*Carya illinoinensis*	Azure sage	*Salvia azurea*
Black hickory	*Carya texana*	Prairie beard tongue	*Penstemon cobaea*
Eastern redbud	*Cercis canadensis*	Gayfeather	*Liatris mucronata*
Black walnut	*Juglans nigra*	Illinois bundleflower	*Desmanthus illinoensis*

Table 1-1. Suggested Tree, Shrub, and Grass Plantings

Common Name	*Scientific Name*	*Common Name*	*Scientific Name*
Bur oak	*Quercus macrocarpa*	Purple prairie clover	*Dalea purpurea*
Roughleaf dogweed	*Cornus drummondii*	Golden Dalea	*Dalea aurea*
Chinkapin oak	*Quercus muehlenbergii*	Texas Star	*Lindheimera texana*
Shumard oak	*Quercus shumardii*	Lance leafed coreopsis	*Coreopsis lanceolate*
Post oak	*Quercus stellata*	Plains coreopsis	*Coreopsis tinctoria*
Shrubs		Horse mint	*Monarda citriodora*
Possumhaw holly	*Ilex decidua*	Black-eyed Susan	*Rudbeckia hirta*
Reverchon hawthorn	*Crataegus reverchonii*	Cut-leaf daisy	*Engelmannia peristenia*
Mexican plum	*Prunus mexicana*	Indian blanket	*Gaillardia puchella*
American beautyberry	*Caillicarpa americana*	Pale purple coneflower	*Echinacea angustifolia*
Grasses		Rattlesnake master	*Eryngium yuccafolium*
Yellow Indiangrass	*Sorghastrum nutans*	Pink evening primrose	*Oenothera speciosa*
Little Bluestem	*Schizachryium scoparium*	Green milkweed	*Asclepias viridis*
Big Bluestem	*Andropogon gerardii*	Antelopehorn milkweed	*Asclepias asperula*
Sideoats grama	*Bouteloua curtipendula*		
Upland switchgrass	*Panicum virgatum*		
Eastern Gammagrass	*Tripsacum dactyloides*		

These assemblages and planting approaches have been utilized in similar, successful habitat establishment projects in the region, including the Lynn Creek West Recreational Development Plan at Joe Pool Lake (USACE 2011) and the Cleveland Gibbs Wildlife Management Area at Grapevine Lake (done in cooperation with Texas Department of Transportation).

1.3 PROJECT AND ACTION AREA

1.3.1 Location

Lewisville Lake is located in north Texas on the Elm Fork of the Trinity River adjacent to Interstate 35 East and State Highway 121 within the northeastern portion of the City of Lewisville. Originally constructed in the 1920s, with the final phase completed in 1955, the lake was designed for conservation storage, flood control, and recreational use. Its construction assisted in preventing seasonal flooding in southeastern Denton County and has stimulated land development along the shores of the lake.

The project area consists of the Lewisville Dam and spillway, and the USACE-owned property (LLELA) downstream of the dam, totaling approximately 3,500 acres, within Denton County, Texas and lying just south of Lewisville Lake. The project features within this area include the Lewisville Dam, the spillway, and the lake outlet and associated conduit (Figure 1-2). LLELA is managed for education, recreation, and ecological restoration by a consortium of organizations lead by the University of North Texas.

Construction activities associated with PFMs 2, 4A, 4B, and 8 would occur between Jones Road and Lewisville Lake. PFM 6 and PFM 7 would occur at the spillway. The ancillary borrow areas and haul routes would occur within LLELA; habitat measures would occur in the borrow areas (Figure 1-2). Only 291.2 acres of the total project area would be subject to direct impact, and within this action area, 247.9 acres are terrestrial habitat (savanna, grassland, upland forest, riparian woodland, and wetlands) and 18.2 acres are aquatic habitat (lacustrine and riverine), both of which have been evaluated for wildlife habitat suitability. The remaining 25.1 acres within the action area is “urban” or developed cover type.

1.3.2 History of Lewisville Lake

In the 1920s, the City of Dallas built the Garza Dam on the Elm Fork of the Trinity River to create Lake Dallas as a municipal water source. The dam was 10,890-feet long with a 587-foot service spillway and a normal pool elevation of 515 feet above mean sea level (msl). Under the purview of the Rivers and Harbors Act of 1945, USACE began construction of the Garza-Little Elm Dam in 1948 to meet the water demands of the growing Dallas community. When completed in 1955, the new dam not only impounded the waters of the Elm Fork of the Trinity River, as Lake Dallas had, but also Stewart, Panther, Cottonwood, Doe Branch, Little Elm, Pecan and Hickory Creeks. The dam and the lake were later renamed for the city in which they were located, Lewisville. The dam is constructed of compacted soil and is 32,888-feet long with a 560-feet spillway at the eastern end of the dam and a conservation pool elevation of 522-feet above msl, and normal flood pool at 537-feet above msl. Gates are located at the opening to conduits to allow controlled releases of water downstream.

1.3.3 Climate, Topography, and Ecology

The climate of Denton County is humid subtropical with hot summers and cool winters, with an occasional front of extremely cold temperatures. The average low and high temperatures range from 33 degree Fahrenheit (°F) in January to 96°F in July. The lowest minimum recorded temperature is -3°F in 1930 and 1949, and the highest maximum is 113°F in 1954. Annual precipitation within Lewisville averages 29.3 inches per year. The terrain consists of rolling hills generally sloping to the east and southeast. Lewisville is situated 709 feet above msl.

The project area is located in the mostly in the Blackland Prairie eco-region, with some remnants of the Cross Timber ecoregion at the project site. The lake lies on the edge of both ecoregions. Blackland Prairie ecological area of Texas (Gould 1962) and is within the identically-named Blackland Prairie natural vegetation area (Diggs et al. 1999). Historically, the area was predominantly tall grass prairie with trees along watercourses, sometimes scattered on the prairie or concentrated in certain areas possibly as a result of locally favorable soil conditions or topography. Fire was probably an important factor in maintenance of the original prairie vegetation and had a major impact on the community structure (Strickland & Fox 1993). Tall grass prairie fires, intensely hot, would have been stopped only by the lack of dry fuel or a change in topography. Even stream bank vegetation was susceptible during dry years. The end result was that trees were rare even along some stream banks, and prairie margins probably extended somewhat beyond the limits of the soil types usually associated with prairie (Hayward & Yelderman 1991). There is considerable variation in the tall grass prairie communities of the Blackland Prairie (Diamond & Smeins 1993) and disagreement about specific community types (Simpson & Pease 1995). However, common dominant grasses of this tall grass prairie ecosystem include little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*), tall dropseed (*Sporobolus compositus*), Texas cupgrass (*Eriochloa sericea*), Florida paspalum (*Paspalum floridanum*), and long-spike tridens (*Tridens strictus*) (Collins et al. 1975). As a whole, most of the Blackland Prairie is a complex mosaic of tall grass communities (Diggs et al. 1999).

With the exception of preserves, small remnants, or native hay meadows, almost nothing remains of the original Blackland Prairie communities. Conversion of the Blackland Prairie for agriculture was the most significant cause of the destruction of this ecosystem, with only marginal, steeply sloped land not rapidly brought under cultivation. High prices for cotton and grains eventually resulted in the cultivation of these areas as well. Once stripped of protective grass, these areas eroded rapidly with disastrous effects. Given the relatively high rainfall and continuing suppression of fire by humans, pioneer species of native trees and shrubs (e.g., eastern red cedar [*Juniperus virginiana*] and cedar elm [*Ulmus crassifolia*]), as well as introduced species, were able to invade and eventually take over areas that were formerly prairie (Diggs et al. 1999).

Soil types within the project area are composed largely of the Trinity-Frio, Eddy-Stephen-Austin, Silawa-Silstid-Bastsil, and Austin-Houston Black representing the Tallgrass Prairie Community of soils associated with floodplains, stream terraces, and uplands along this portion of the Trinity River floodplain. This community is characterized by deeper soils underlain at rather shallow depths by dense, hard, clayey material. This “claypan” restricts air and water movements, as well as root penetration. It is typically dominated by warm-season, perennial tallgrasses, with warm season, perennial midgrasses filling most of the remaining species composition. The warm season, perennial forb component varies between 5 and 15% depending on climatic patterns and local precipitation. Historically, woody species made up a minor component of the community, 5% or less (USDA 2009). The tree species noted most often in the Blackland Prairie ecoregions of the project area during data collection were green ash (*Fraxinus pennsylvanica*), pecan (*Carya illinoinensis*), black willow (*Salix nigra*), American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), cedar elm, red mulberry (*Morus rubra*), and bur oak (*Quercus macrocarpa*). The Cross Timbers ecoregion portions of the project area are typified by blackjack oak (*Quercus marilandica*), Shumard oak (*Quercus shumardii*), and black hickory (*Carya texana*). Although past agriculture practices have brought upland characteristics to portions of the project area, historically more of it was likely dominated by additional riparian woodland forest.

The project area is used by both resident and migratory wildlife species, especially those that are tolerant of human activity. Small mammals and migratory and resident passerines use the wooded areas along the watercourses for nesting, foraging and as a dispersion corridor. The more heavily impacted woodlands within the project area are most likely used by a variety of migratory and resident passerine, owl, and hawk species which may disperse from areas subjected to lesser disturbance. Some common resident bird species that may be observed in the project area are sparrows (various species), northern mockingbird (*Mimus polyglottos*), American robin (*Turdus migratorius*), northern cardinal (*Cardinalis cardinalis*), blue jay (*Cyanocitta cristata*), common grackle (*Quiscalus quiscula*), scissor-tailed flycatcher (*Tyrannus forficatus*), barred owl (*Strix varia*), common crow (*Corvus brachyrhynchos*), American kestrel (*Falco sparverius*), Carolina chickadee (*Parus carolinensis*), and red-tailed hawk (*Buteo jamaicensis*). Mammal species that may utilize appropriate habitats in the project area include raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), eastern cottontail (*Sylvilagus floridanus*), fox squirrel (*Sciurus niger*), and small rodents. Various species of frogs and turtles may be found in suitable waterbodies, while lizards and snakes may also persist in viable terrestrial habitats within the project area. A list of floral and faunal species that were observed during field investigations carried out in 2013 in the project area is included on each site observation sheet in Appendix B of the 2014 PAL.

LLELA is a key resource for regional pollinators. LLELA provides a large, unfragmented landscape surrounded by intensely developing and urbanizing private land. LLELA’s location adjacent to Interstate 35 makes it particularly important for migrating monarch butterflies. The Interstate 35 corridor is a priority focus for restoration in the *National Strategy to Promote the Health of Honey Bees and Other Pollinators* (Pollinator Health Task Force 2015).

CHAPTER 2
EXISTING HABITATS AND WILDLIFE RESOURCES

2.1 HABITAT EVALUATION METHODS

Using data compiled from previous site visits between October 16 and 23, 2013, a habitat evaluation was conducted on the action area, which is composed of five terrestrial habitat types: riparian woodlands, upland forests, wetlands, grasslands, and savannas. Spatial data depicting habitat cover types utilized in the analysis and evaluation are illustrated in Figure 1-2. The USFWS HEP models (USFWS 1980) were used to analyze existing habitats in the project area. Five aquatic habitat sites within the Elm Fork of the Trinity River were surveyed in November 2013 and analyzed using IBI (refer to 2014 PAL, Appendix F).

Seven wildlife indicator species were selected to represent the wildlife communities that use the five habitats evaluated (Table 2-1). The fox squirrel, barred owl, downy woodpecker (*Picoides pubescens*), and wood duck (*Aix sponsa*) were selected to represent those species that use riparian woodlands. The fox squirrel, barred owl, and downy woodpecker, were selected to represent upland forests. Species selected to evaluate wetland habitat included the wood duck and the belted kingfisher (*Megaceryle alcyon*). The eastern meadowlark (*Sturnella magna*) and eastern cottontail were selected to represent the wildlife communities in grasslands. The fox squirrel, eastern meadowlark, and eastern cottontail were chosen to represent savannas.

Table 2-1. Indicator Species Used by Habitat Type

Habitat Type	*Species Used*
Riparian Woodland	Fox Squirrel
	Barred Owl
	Downy Woodpecker
	Wood Duck
Upland Forest	Fox Squirrel
	Barred Owl
	Downy Woodpecker
Wetland	Wood Duck
	Belted Kingfisher
Grassland	Eastern Meadowlark
	Eastern Cottontail
Savanna	Fox Squirrel
	Eastern Meadowlark
	Eastern Cottontail

HEP involves the use of Habitat Suitability Index (HSI) models for each indicator species. Only species for which certified, peer-reviewed models currently exist were chosen for this HEP analysis. The HEP models contain a list of structural habitat composition variables that are contained in optimum habitat. To determine the existing conditions for each of the habitats, all variables for each species representing each habitat were estimated based on data from HEP sites from the 2013 surveys that fell within or near the area being evaluated. If multiple HEP sites were located within or near the area of evaluation, then values for each habitat composition variable were averaged (refer to 2014 PAL; Appendix C). Thirteen variables were analyzed for the riparian woodland. There were nine upland forest variables, twelve wetland variables, seven grassland habitat variables, and ten savanna variables. These variables were measured or estimated within a tenth-acre data site within the habitat they represent; they are used as indicators of habitat condition or value.

Baseline habitat conditions are expressed as a numeric function (HSI value) ranging from 0.0 to 1.0, where 0.0 represents no suitable habitat for an indicator species and 1.0 represents optimum conditions for the species. HSI values ranging from 0.01 to 0.24 are considered “poor” habitat, 0.25 to 0.49 are considered “below average” habitat, 0.50 to 0.69 are “average” habitat, 0.70 to 0.89 are “good” habitat, and 0.90 to 1.00 are considered “excellent” habitat. Habitat Units (HUs) are calculated by multiplying the HSI for each habitat by the amount of acres of the same habitat. The HSI models for the indicator species are available in the References, Chapter 6 (USFWS 1982a, 1982b, 1983a, 1983b, 1984, 1985, 1987). A summary of the approved models is available here:

http://www.nwrc.usgs.gov/wdb/pub/hsi/USGS-BRD-ITR_1997-0005.pdf (U.S. Geological Survey 1997).

The 2014 PAL includes a complete list of plant species observed during the surveys (Appendix A); the individual site observation sheets that contain a physical description of each site, and a list of plants and animals observed at the site (Appendix B); and photographs taken in each compass direction from the center of each survey site (Appendix D).

2.2 HABITAT DESCRIPTIONS AND SUITABILITY INDEX VALUES

Five terrestrial wildlife habitat types are present within the project area. These include 302.2 acres of riparian woodland (8.6 percent [%] of the project area), 1,197.7 acres of upland forest (34.2%), 117.8 acres of wetlands (3.4%), 594.4 acres of grassland (17.0%), and 1,002.4 acres of savanna (28.6%). Also found on the site are 43.7 acres of lacustrine habitat (1.2% of the project area), 25.0 acres of riverine habitat (0.7%) and 215.6 acres of urban development (6.2%).

The areas evaluated for habitat suitability were the action area, including the construction footprints of proposed features and the sites proposed for borrow materials to support project alterations. These areas included 114.7 acres of savanna (39.4% of the action area), 77.2 acres of grassland (26.5%), 48.1 acres of upland forest (16.5%), 7.6 acres of riparian woodland (2.6%), and 0.3 acres of wetlands (0.1%). The action area also contains 17.7 acres of lacustrine habitat (6.1% of the action area) and 0.5 acre of riverine habitat (0.2%) evaluated in the IBI aquatic study. Finally, the action area includes 25.1 acres of urban development (8.6%) not included in the evaluation.

The following findings and tables contain the HSI for the five habitats per evaluation group per species or survey site and a summary table of the existing habitat acres, HSIs, and HUs for each habitat type. Planning recommendations for these habitats are included at the end of this chapter.

2.2.1 Riparian Woodland

Riparian woodlands are typically bottomland hardwoods; however, the action area contains some riparian woodlands that could be classified as upland previously influenced by streams, which existed before the construction of the dam. The HEP defines the bottomland hardwood cover type as wetland areas dominated by deciduous trees, usually along streams, and that are occasionally flooded. In optimum conditions, this cover type provides food, cover, nesting habitat, and living space to riparian forest dependent species. Large trees are important as nesting habitat for the fox squirrel, wood duck, and barred owl, and escape cover for raccoons, wood ducks, and passerines. Large mast producing trees and shrubs provide food for the fox squirrel. Brush piles and snags provide necessary food, cover, and shelter for wildlife such as raccoons and passerines. Close proximity to water is important for the wood duck. Riparian forest habitats are essential in maintaining biodiversity and providing important wildlife travel corridors.

Riparian woodlands make up 8.6% of the project area and 2.6% of the action area, and are primarily located along the various outflows, some of which no longer permanently contain water since the completion of the dam. Many of these woodlands are periodically flooded and are predominately composed of American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), pecan (*Carya illinoinensis*), cedar elm (*Ulmus crassifolia*), black willow (*Salix nigra*), and bur oak (*Quercus macrocarpa*). Other trees species present include eastern red cedar (*Juniperus virginiana*), cottonwood (*Populus deltoids*), boxelder (*Acer negundo*), red mulberry (*Morus rubra*), and green ash (*Fraxinus pennsylvanica*).

Rapid conversion of riparian woodland to upland forest is ongoing, and is marked by differences in habitat observed between the 2011 PAL and the 2014 PAL. Considering the age of the reservoir (1955), it is likely that areas along former streambanks may further lose riparian woodland characteristics as old-growth vegetation matures, dies, and succession of more upland-type vegetation occurs.

Data from Sites 9, 56, 61, and 66 of the 2013 HEP were averaged together to estimate the existing conditions of riparian woodlands in the action area. These locations were chosen due to their proximity to the edge of the habitat to resemble the likely condition of the riparian habitat found in the action area. Most of the riparian sites are dominated by overstory trees that are at the lower extent of that which would be considered optimal (>12 inches dbh); however, old-growth large trees were scattered throughout former streambank areas.

The cover and reproduction requisite was the most limiting factor for fox squirrels in the action area. There was a very limited number of overstory trees with sufficient dbh for nesting.

The food requisites were estimated to be above average or excellent for the downy woodpecker in the action area. The most limiting factors for barred owl were the minimal number of overstory trees with sufficient dbh for nesting and the corresponding low percentage of overstory canopy cover.

The value of this cover type was poor for the wood duck in the action area due to the low number of potentially suitable nest cavity trees and the lack of brood and winter cover.

The overall HSI value for the riparian woodland is below average at 0.45; the total HUs for the action area is 3.42 (Table 2-2).

Table 2-2. Existing HSI and HU Values for Riparian Woodland Habitat per Indicator Species

Indicator Species	*HSI*
Barred Owl	0.25
Wood Duck	0.04
Downy Woodpecker	0.60
Fox Squirrel	0.92
HSI Average	**0.45**
Acres	7.6
Habitat Units	**3.42**

The limiting factors for riparian woodland habitat for the action area are listed below.

- Overstory trees are generally too small to provide nest sites for fox squirrel and barred owl.
- Minimal nest sites for the wood duck.
- Minimal winter and brood cover along the banks for the wood duck.

2.2.2 Upland Forest

Deciduous forests are upland hardwood areas dominated by trees with a minimum tree canopy cover of 25%. Upland forests provide food, cover, nesting habitat, and living space to upland forest dependent species. Three species were utilized to represent the upland forest guild: barred owl, fox squirrel, and downy woodpecker. Large trees are important as nesting habitat for the fox squirrel and barred owl. White-tailed deer (*Odocoileus virginianus*), small mammals, turkey (*Meleagris gallopavo*), bobwhite quail (*Colinus virginianus*), and many other species of birds utilize these stands for food and/or cover.

Upland forest make up 34.2% of the project area and 16.5% of the action area. Cedar elm, eastern red cedar, post oak (*Quercus stellata*), and hackberry dominate this cover type. Other tree species associated with this forest type include cottonwood, green ash, bois d'arc (*Maclura pomifera*), gum bumelia (*Bumelia lanuginosa*), and Chinaberry (*Melia azedarach*). The shrub layer consists of gum bumelia, hackberry, cedar elm, post oak, red mulberry, flowering dogwood (*Cornus florida*), coralberry (*Symphoriacarpos orbiculatus*), western soapberry (*Sapindus saponaria*), and honey locust (*Gleditsia triacanthos*).

Data from Sites 20, 40, 41, 49, 62, 63, and 142 of the 2013 HEP were averaged together to estimate the existing conditions of upland forests in the action area. These locations were chosen because they are located in the same contiguous upland forest found in and are close in proximity to the action area.

The HSI values for each species for this cover type in the action area range from poor for the fox squirrel (0.03), below average for the barred owl (0.30), and average for the downy woodpecker (0.57). The most limiting factors in this cover type are (1) distance to available grain for fox squirrel, 2) the lack of large trees required by the fox squirrel and barred owl, (3) overstory tree minimum dbh required by the barred owl, and (4) a lack of snags required by the downy woodpecker.

The overall HSI for the upland forest is below average at 0.30; the total HUs for the action area is 14.43 (Table 2-3).

Table 2-3. Existing HSI Values for Upland Forest Habitat per Indicator Species

Indicator Species	*Action Area*
Barred Owl	0.30
Downy Woodpecker	0.57
Fox Squirrel	0.03
HSI Average	**0.30**
Acres	48.1
Habitat Units	**14.43**

The limiting factors for upland habitat for the action area are listed below.

- Insufficient access to available grain for fox squirrel.
- Overstory trees are generally too small to provide nest sites for fox squirrel and barred owl.

2.2.3 Wetland

Wetlands make up only 3.4% of the project area and only 0.1% of the action area. Herbaceous wetlands are areas dominated by non-woody vegetation. Wetlands provide food and cover for fish, resident and migratory birds, small mammals, invertebrates, and the predators that feed on these species. Wetlands are important nesting habitat for wading birds and waterfowl and are comprised primarily of rushes, sedges, wetland grasses, and aquatic plants located along the edges of water bodies and creeks, and in seasonally flooded areas. Some of the wetlands evaluated are permanent, but most are likely seasonal.

Data from Sites 37, 44, 58 and 71 of the 2013 HEP were used to estimate the existing conditions of wetland habitat in the action area. The habitat is estimated to be excellent habitat for the wood duck as a result of ideal brood cover available in the area. The limiting factor for the kingfisher is the water life requisite. In particular, riffles are absent, shallow waters are insufficient, and water transparency is low.

The overall HSI for the wetlands is below average at 0.19; the total HUs for the entire action area is 0.06 (Table 2-4).

Table 2-4. Existing HSI Values for Wetland Habitat per Indicator Species

Indicator Species	*HSI*
Wood Duck	0.04
Belted Kingfisher	0.33
HSI Average	**0.19**
Acres	0.3
Habitat Units	**0.06**

The limiting factors for wetland habitat for the action area are listed below.

- Lack of riffles, and therefore a lack of nutrient-rich and abundant food sources for the belted kingfisher.
- Water is too deep for successful fishing by the belted kingfisher.
- Water turbidity is too high for successful fishing by the belted kingfisher.

2.2.4 Grassland

Grasslands are dominated by grasses (native or introduced), and have a canopy cover of 25% or less. Grasslands provide open space, a food source for passerines and the eastern cottontail, and cover for escape and nesting by means of tall grass, scattered brush piles, and shrubs for a variety of animals. Red-tailed hawks hunt for prey in open grasslands.

This cover type makes up 17.0% of the project area, and 26.5% of the action area. Nearly 40% of the action area grassland is north of Jones Road and considered "improved grassland" on and adjacent to the Lewisville Dam. Improved grasslands have a substantial non-native component, and are frequently mown as part of regular operations and maintenance activities. The remaining unmanaged grasslands are fallow fields also containing a combination of native and introduced grasses, forbs, and trees. Portions of these areas are managed through the LLELA organization for prairie restoration, with activities including periodic prescribed burning and native seeding to reduce encroachment by shrubs, trees, and non-native species. The grass species found in the data plots were Johnsongrass (*Sorghum halepense*), coastal bermuda (*Cynodon dactylon*), little bluestem (*Schizachyrium scoparium*), bushy bluestem (*Andropogon glomeratus*), Canada wildrye (*Elymus Canadensis*), King Ranch bluestem (*Bothriochloa* sp.), Virginia wildrye (*Elymus virginicus*), and Texas wintergrass (*Nassella leucotricha*).

Data from Sites 13, 14, 15, 68, 69, and 73 of the 2013 HEP were used to estimate the existing conditions of grassland habitat in the action area. These HEP sites were chosen based on their locations within the action area. The HSI value for the eastern meadowlark is 0.82 and considered good habitat. With an HSI value of 0.13, the grassland habitat is poor habitat for the eastern cottontail, the limiting factor being the lack of any kind of canopy closure (tree, shrub, or herbaceous). Without canopy coverage, the habitat is assumed to lack the resources needed to provide adequate winter habitat. The overall HSI for the grassland is below average at 0.48; the total HUs for the entire action area is 37.06 (Table 2-5).

Table 2-5. Existing HSI Values for Grassland Habitat per Indicator Species

Indicator Species	*HSI*
Eastern Meadowlark	0.82
Eastern Cottontail	0.13
HSI Average	**0.48**
Acres	77.2
Habitat Units	**37.06**

The limiting factor for grassland habitat for the action area is listed below.

- Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation).

2.2.5 Savanna

Savanna is a non-wetland area with a shrub and/or tree canopy cover between 5-25%, but with a total canopy cover of all vegetation greater than 25%. The area between the mottes of trees and shrubs is typically dominated by grasses or other herbaceous vegetation. Savannas provide open space, a food source for passerines and the eastern cottontail, and cover for escape and nesting by means of tall grass, scattered brush piles, and shrubs for a variety of animals.

Savanna makes up 28.6% of the project area and 39.4% of the action area. Unmanaged savannas such as those within the action area typically consist of fallow fields also containing a combination of native and introduced grasses, forbs, and trees, but the composition is different from those in the short grass areas. The grass species found in the data plots were Johnsongrass, little bluestem, Canada wildrye, coastal bermuda, sedges (*Carex* sp.) and barnyard grass (*Echinochloa crus-galli*). Tree and shrub species found within the savanna sites include green ash, cottonwood, common persimmon (*Diospyros virginiana*), American elm, Texas hawthorn (*Crataegus texana*), black willow, cedar elm, pecan, mesquite (*Prosopis glandulosa*), bumelia, wild plum (*Prunus mexicana*), red oak (*Quercus buckleyi*), honey locust and honey mesquite (*Prosopis glandulosa*).

Data from Sites 10, 48, 51, 54, 55, and 65 of the 2013 HEP were used to estimate the existing conditions of savanna habitat in the action area. These HEP sites were chosen based on their locations within the action area. Three indicator species represent the savanna guild: fox squirrel, eastern meadowlark, and eastern cottontail. The HSI for this cover type was poor for the fox squirrel (0), below average for the eastern meadowlark (0.36), and average eastern cottontail (0.52). The limiting factors for fox squirrel was the minimal number of overstory trees with sufficient dbh for nesting and the corresponding low percentage of overstory canopy cover. The life requisites for eastern meadowlark were all of an average suitability index, but cumulatively contribute to a below average HSI. The limiting factor for the eastern cottontail was the lack of any kind of canopy closure (tree, shrub, or herbaceous).

The overall HSI for the savanna is below average at 0.29; the total HUs for the entire action area is 33.26 (Table 2-6).

Table 2-6. Existing HSI Values for Savanna Habitat per Indicator Species

Indicator Species	*HSI*
Eastern Meadowlark	0.36
Eastern Cottontail	0.52
Fox Squirrel	0
HSI Average	**0.29**
Acres	114.7
Habitat Units	**33.26**

The limiting factors for savanna habitat for action area are listed below.

- Overstory trees are generally too small to provide nest sites for fox squirrel.
- Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation).

2.2.6 Riverine

Aquatic riverine habitat within the action area includes 0.5 acre of the Elm Fork River adjacent to, and fed by, the outlet structure for Lewisville Lake. Aquatic riverine habitat in the Elm Fork exhibits exceptional overall aquatic life use value, with an average IBI of 0.86 resulting in 0.43 HU (Table 2-7).

Table 2-7. Existing IBI Values for Aquatic Riverine Survey Sites

Sampling Site	*IBI*
1	0.71
2	0.75
3	1.00
4	0.88
5	0.98
Average IBI	**0.86**

The limiting factors for the IBI included difficulties accessing and properly surveying Sites 1 and 2, such as steep banks, undercut banks, and slick substrate. In addition, these sites were lacking riffle habitat, which may have impeded the collection of a representative sample of the fish community.

2.2.7 Lacustrine

The action area contains 17.7 acres of lacustrine habitat, or 0.06% of the total lake area. This habitat is on the upstream side of the spillway and is irregularly inundated, varying with lake level. The area is also subject to periodic dredging for maintenance by USACE. Because of the highly variable nature of this section of the lake, as well as regular disturbance and the relatively small proportion the action area includes of the continuous lacustrine habitat, an estimate of the IBI of this habitat would not be useful in this analysis. For this reason, lacustrine habitat is not included in the following projections and quantitative analysis. Qualitative descriptions of lacustrine impacts have been included as appropriate.

2.3 HABITAT UNITS SUMMARY

Table 2-8 presents a summary of total HUs for each habitat type within the action area. The majority of the habitat in the action area is savanna (114.7 acres). Grassland habitat is the second most common habitat type with 77.2 acres, and upland forest the third most common habitat type with 48.1 acres. However, due to the quality of the habitats, grassland has the highest HUs with 37.06 HU. Wetlands and riverine habitats have the lowest HUs (0.06 and 0.43 HUs, respectively) in the action area, largely because they have the least amount of acreage (0.3 and 0.5 acres, respectively).

Table 2-8. Existing Habitat Units per Habitat Type

Habitat Types	*Baseline HU*
Riparian Woodland	3.42
Upland Forest	14.43
Wetland	0.06
Grassland	37.06
Savanna	33.26
Riverine	0.43
Total	88.66

2.4 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

Based on the USFWS Information for Planning and Conservation (IPaC) report obtained for this project, the federally-listed threatened or endangered species known to occur in and around the project area include the endangered whooping crane (*Grus americana*) and the interior least tern (*Sternula antillarum*). The piping plover and the red knot also have the potential to occur, but per the IPaC report, these birds need only be considered for wind energy projects and are not likely to be impacted by the current Proposed Action (USFWS 2016). The IPaC also incorporates the Birds of Conservation Concern, on which 19 species are identified as potentially occurring in the Project Area.

2.4.1 Threatened and Endangered Species

Whooping cranes may be encountered in any county in north central Texas during migration. Autumn migration normally begins in mid-September, with most birds arriving on the wintering grounds at Aransas National Wildlife Refuge between late October and mid-November. Spring migration occurs during March and April. Whooping cranes prefer isolated areas away from human activity for feeding and roosting, with vegetated wetlands and wetlands adjacent to cropland being utilized along the migration route. Foods consumed usually include frogs, fish, plant tubers, crayfish, insects, and waste grains in harvested fields. It is possible that whooping cranes may temporarily utilize habitats present within the project area during their annual migration but an encounter would be a rare occurrence. It is unlikely that any of the proposed modifications to the floodplain would have an adverse impact on this species.

The endangered interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers and streams in Texas from May through August. Nesting areas are ephemeral, changing as sandbars form, move, and become vegetated. Because natural nesting sites have become sparse, interior least terns have nested in atypical/non-natural areas, which provide similar habitat requirements. For example, one colony has been nesting for several years at the Southside Wastewater Treatment Plant in Dallas. Non-natural nesting sites include sandpits, exposed areas near reservoirs, gravel levee roads, dredge islands, gravel rooftops, and dike-fields. In recent years, terns have been utilizing artificial habitat more frequently within the Dallas-Fort Worth Metroplex area with small colonies being established in highly developed areas. During the flood event in 2015 approximately one dozen least terns were attempting to nest on a flooded road in Westlake Park, approximately eight miles north of the project area. It is unlikely that any of the proposed modifications to the floodplain would have an adverse impact on this species. Should least terns arrive at any of the project areas during the breeding season, the USFWS should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act.

2.4.2 Birds of Conservation Concern

The bald eagle (*Haliaeetus leucocephalus*), the American peregrine falcon (*Falco peregrinus anatum)*, and the Arctic peregrine falcon (*F. peregrinus tundrius*) were formerly listed in Denton County but were removed from the federal threatened and endangered species list (effective August 8, 2007, August 25, 1999, and October 5, 1994, respectively). However, bald eagles and peregrine falcons are still afforded safeguards under the Migratory Bird Treaty Act; the bald eagle is further protected by the Bald and Golden Eagle Protection Act.

We recommend all activities be conducted in accordance with the USFWS's National Bald Eagle Management Guidelines, which may be accessed at:

http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf.

The USFWS published the *Birds of Conservation Concern 2008* (BCC) in December 2008. "The overall goal of the BCC is to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action." (USFWS 2008)

Copies of the Birds of Conservation Concern 2008 may be obtained by writing to the Chief, Division of Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Mail Stop 4107, Arlington, VA 22203-1610, ATTN: BCC 2008. It is also available for downloading on the Division of Migratory Bird Management's web page at:

http://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf

The following are 19 species on the BCC lists that may utilize appropriate habitat types within the general vicinity of action area:

- little blue heron (*Egretta caerulea*) – inland marshes and ponds
- swallow-tailed kite (Elanoides forficatus) – riparian forests, upland forests, and wetlands
- bald eagle (*Haliaeetus leucocephalus*) – mature forests near large bodies of water
- peregrine falcon (*Falco peregrinus*) – generalist
- black rail (*Laterallus jamaicensis*) – salt or freshwater marshes, flooded grasslands
- upland sandpiper (*Bartramia longicauda*) – grasslands
- long-billed curlew (*Numenius americanus*) – open water, prairies, and savannas
- Hudsonian godwit (*Limosa haemastica*) – inland marshes
- buff-breasted sandpiper (*Tryngites subruficollis*) – prairies, margins of lakes
- red-headed woodpecker (*Melanerpes erythrocephalus*) – woodlands
- scissor-tailed flycatcher (*Tyrannus forficatus*) – prairies, savannas, and open shrubland
- loggerhead shrike (*Lanius excubitor*) – open savanna, shrubland
- Bell's vireo (*Vireo bellii*) – dense thicket
- Sprague's pipit (*Anthus spragueii*) – short grass prairie
- Swainson's warbler (*Limnothlypis swainsonii*) – riparian woodland
- Henslow's sparrow (*Ammodramus henslowii*) – grasslands with scattered shrub
- Harris' sparrow (*Zonotrichia querula*) – scrub, undergrowth in open woodlands and savanna, thickets, brushy fields, and hedgerows
- Smith's longspur (*Calcarius pictus*) – short grassland
- orchard oriole (*Icterus spurius*) – open woodlands and shrublands, savannas, marsh edges and lakeshores

Because some of these species could potentially utilize appropriate habitats within the action area**,** especially as temporary stopover breaks during annual migration, it is recommended that future projects avoid and/or minimize adverse impacts to intact habitats whenever possible.

2.5 RECOMMENDATIONS

The habitat analysis indicates the following specific measures could be beneficial for the restoration of natural habitats impacted by activities within the action area.

1. In borrow areas, salvage topsoil to re-surface at the project completion.
2. Borrow areas should be graded to minimize the alteration of local hydrology and contoured to connect to existing surrounding contours to hasten the re-establishment of vegetation following project completion.
3. Recommend planting mast producing trees and shrubs in the borrow areas where they are lacking to improve the canopy cover and food base.
4. Provide brush and log piles in existing habitats where they are lacking to provide cover for small mammals.
5. Create native grasslands, where possible, throughout the project area to replace Bermuda grass and Johnsongrass.
    a. Recommend planting native grass and forb species (as identified in Table 1) appropriate for the soils.
    b. Plant shrub and tree mottes in savannas, and maintain them to no more than about 10% canopy cover.
6. Any mowing schedule that may be developed should promote tall grass growth, but not interfere with tall-grass nesting birds.
7. Recommend that the direct, indirect, and cumulative impacts and conservation needs of the *BCC 2008* be considered during any restoration or flood control project planning.

2.6 SUMMARY

Much of the habitat south of Lewisville Dam is in below average condition. Aside from the wetland habitat, which is considered average, all other habitats are estimated to be below average or poor quality. However, there are still some valuable wildlife habitats remaining within the area. The specific habitat restoration measures recommended in this report could help restore some of the natural habitats and improve habitat diversity and quality of remaining habitats; therefore, benefitting a variety of resident and migratory wildlife species.

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CHAPTER 3
FUTURE WITHOUT PROJECT CONDITION

3.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats under the Future without Project Condition (FW/OPC), over the next 50 years within the ROI. The FW/OPC presents the estimated future conditions in the absence of the Proposed Action. The Lewisville Lake Operations Manager indicates that under the FW/OPC there are no foreseeable future changes to land use classifications (Personal communication 29 September 2014). The area around the lake is highly urbanized, while future development will continue the land use changes are expected to be minimal. The project area, habitat types (riparian woodland, upland forest, wetland, grassland, savanna, riverine, and lacustrine) and action area from Chapter 2 are used for the FW/OPC evaluation.

3.2 CHANGES TO HABITAT ACREAGES UNDER THE FUTURE WITHOUT PROJECT CONDITION ALTERNATIVE

Within the project area as a whole, substantial change was observed between the site visits supporting the 2011 PAL and those for the 2014 PAL. The most notable observed change is the substantial drying of riparian woodland (referred to interchangeably in the 2011 PAL report with bottomland hardwood) into upland forest currently observed at the site. Within all of LLELA, more than 70% of what had previously been considered riparian woodland is now considered upland forest. Grassland was also observed to be developing into savanna, and savanna into upland forest. Overall, upland forest has increased by more than 700% in the last 8 years.

Under the FW/OPC, there is expected to be minimal change in the action area since the Proposed Action features would not be constructed and material from the borrow sites would not be needed. Climate change is expected to create warmer (increases in temperature) and drier (decreases in precipitation) conditions in the region (U.S. Global Change Research Program 2014). The riparian woodland currently remaining is limited to drainages, and—assuming no major disturbance—is expected to persist with the support of annual flooding. Tree encroachment observed in the savanna habitat is already somewhat high, with tree canopy closure at 28%, and this trend is expected to continue, resulting in savanna rapidly trending towards upland forest. Grasslands are expected to undergo less successional development, as the improved grasslands would continue in their current operations and maintenance regime. LLELA organizational treatments of grasslands (including periodic controlled burns to limit shrub encroachment) are also expected to continue.

All habitat types occur in the action area under existing conditions. Table 3-1 presents the predicted acreages for the habitat types in the action area over the 50 years following Year 0 under the FW/OPC. No change in the existing habitat is anticipated between existing conditions and Year 0. Since no actions are expected to take place in the action area under the FW/OPC, habitat change would be driven by climate change. Trends for changes anticipated over the next 50 years were determined based on observed changes between the field visits supporting the 2011 PAL and the 2014 PAL, as well as the National Climate Assessment (U.S. Global Change Research Program 2014).

Table 3-1. Estimated Changes in Habitat Acreages in the Action Area over the Next 50 Years under the Future without Project Condition Alternative

Habitat Type	*Existing Conditions*	*Year (acres)*					
		0	*1*	*5*	*10*	*25*	*50*
Riparian Woodland	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Upland Forest	48.1	48.1	53.8	64.7	74.5	92.2	106.3
Wetland	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Grassland	77.2	77.2	77.2	77.2	77.2	77.2	77.2
Savanna	114.7	114.7	109.0	98.1	88.3	70.6	56.5
Riverine	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Habitat Subtotal	*248.4*	*248.4*	*248.4*	*248.4*	*248.4*	*248.4*	*248.4*
Urban Area	25.1	25.1	25.1	25.1	25.1	25.1	25.1
Total	**273.5**	**273.5**	**273.5**	**273.5**	**273.5**	**273.5**	**273.5**

Note: Year 0 is based on the potential implementation date of the Proposed Action. Lacustrine habitat is not included in projections or quantitative analysis (refer to section 2.2.7).

3.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES

Below are HSI, acreage, and HU tables for the habitats within the action area. HSIs in wetland habitats are expected to increase over the next 50 years due to increased regulations and technological advances to increase water quality. HUs are determined by multiplying HSI and acreage.

Table 3-2 presents the HSIs, acres, and HUs under the FW/OPC alternatives for the habitats found in the action area over the next 50 years. The habitat in the project area has existed in a partially maintained and partially natural since the dam was built in 1955; therefore, the HSIs are expected to change very little over the next 50 years. The quality of riparian woodlands and upland forests is expected to increase over the next 50 years, as the forested habitats mature and key variables determining suitability of the habitat improve (e.g., average dbh would continue to increase as trees age). Grasslands would increase slightly, as ongoing maintenance would improve herbaceous canopy cover, a key variable to eastern meadowlark habitat. Savanna habitat would also increase in quality, as increasing shrub cover, as it currently observed to be occurring, would improve habitat for eastern cottontail. Increased shrub cover would also reduce the quality for the eastern meadowlark, but the gains in the modelling for the eastern cottontail are greater than the losses projected for the meadowlark. Riverine habitats are expected to improve more gradually due to increased regulations and technology for improvements to water and air quality.

Table 3-2. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the Future without Project Condition Alternative

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Riparian Woodland							
HSI	0.45	0.45	0.45	0.46	0.49	0.53	0.58
Acres	7.6	7.6	7.6	7.6	7.6	7.6	7.6
HUs	3.42	3.42	3.42	3.5	3.72	4.03	4.41
Upland Forest							
HSI	0.30	0.30	0.30	0.31	0.33	0.38	0.40
Acres	48.1	48.1	53.8	64.7	74.5	92.2	106.3
HUs	14.43	14.43	16.14	20.06	24.59	35.04	42.52
Wetland							
HSI	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Acres	0.3	0.3	0.3	0.3	0.3	0.3	0.3
HUs	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Grassland							
HSI	0.48	0.48	0.48	0.48	0.48	0.48	0.49
Acres	77.2	77.2	77.2	77.2	77.2	77.2	77.2
HUs	37.06	37.06	37.06	37.06	37.06	37.06	37.83
Savanna							
HSI	0.29	0.29	0.29	0.30	0.30	0.31	0.31
Acres	114.7	114.7	109.0	98.1	88.3	70.6	56.5
HUs	33.26	33.26	31.61	29.43	26.49	21.89	17.52
Riverine							
IBI	0.86	0.86	0.86	0.86	0.86	0.87	0.88
Acres	0.50	0.50	0.50	0.50	0.50	0.50	0.50
HUs	0.43	0.43	0.43	0.43	0.43	0.44	0.44

3.4 HABITAT UNITS SUMMARY

As presented in Table 3-3, HUs would change more for some habitats than others in 50 years under the FW/OPC. Left undisturbed, savannas are anticipated to continue to develop into upland forests, causing a decrease in savanna HUs and an increase in upland forest HUs. Riverine HUs in the action area would increase very slightly in 50 years under the FW/OPC due to an increase in the IBI as a result of increased regulations and technology for improvements to water quality. Grasslands are expected to slightly increase in 50 years under the FW/OPC due to increases in the HSI values in the habitats.

Table 3-3. Estimated Habitat Unit Values for Habitats within the Action Area under Baseline and Future Without Project Condition (Year 50)

Habitat	*HUs*		
	Baseline	*FW/OPC*	*Change*
Riparian Woodland	3.42	4.41	0.99
Upland Forest	14.43	42.52	28.09
Wetland	0.06	0.06	0
Grassland	37.06	37.83	0.77
Savanna	33.26	17.52	-15.74
Riverine	0.43	0.44	0.01
Total HU	**88.66**	**102.78**	**14.12**

3.5 SUMMARY

Under the FW/OPC, habitat in the ROI is not expected to be impacted by any projects; therefore, habitat acreage changes would be driven by a combination of natural successional trends and climate change. Common aquatic and terrestrial wildlife that occur within the area are likely to continue to occur in the area after the implementation of the FW/OPC. Riverine flood events under the FW/OPC would continue to have a variety of impacts, both beneficial and adverse.

CHAPTER 4
PROPOSED ACTION ALTERNATIVE

4.1 INTRODUCTION

This chapter describes potential impacts to fish and wildlife habitats from the implementation of the Proposed Action Alternative over the next 50 years. The project area habitat types (riparian woodland, upland forest, wetland, grassland, savanna, lacustrine, and riverine) and action area from Chapter 2 are used for the evaluation of the Proposed Action Alternative. The impacts to fish and wildlife habitats from the implementation of the Proposed Action Alternative, including the implementation of the dam safety modifications, ancillary improvements including access roads and borrow areas, and habitat measures are described below.

4.2 CHANGES TO HABITAT ACREAGES

In Year 0, 291.2 acres of existing habitat would become urban from the implementation of the Proposed Action Alternative. Immediately after the implementation of the Proposed Action, terrestrial habitat-type acreage in the project area would decrease by the size of the action area as they will have been impacted without yet having opportunity to reestablish. The greatest decrease of habitat acreage would be to savanna habitat, followed by grasslands and upland forest. Wetlands would be the least impacted due to the minimal amount of wetland habitat found in the action area. Lacustrine and riverine habitat would be maintained.

4.2.1 Predicted Changes in Habitat Type

Beyond Year 0, changes in habitat from both project impacts and natural successional process are anticipated. The degree of change is directly connected to the source of impacts. Terrestrial habitats impacted by permanent, constructed site features would become urban cover type. This accounts for 11.2 acres of grassland and 0.2 acres of savanna that would become urban. All the grassland impacted is currently considered “improved grassland” and is currently comprised of a high level of nonnative grasses and is frequently mown.

Terrestrial habitats impacted by the temporary access road, staging, and stockpiling would slowly return to their pre-project habitats, with the exception of riparian woodlands. Grassland habitat would return most rapidly, as the disturbed areas would be seeded at the conclusion of activities. Because of the rapid conversion of riparian woodlands currently observed in the project area, it is unlikely that riparian woodlands would re-establish after being impacted within the action area. Instead, these areas are likely to return and trend toward upland forest.

Terrestrial habitat impacted by the maintenance activities that would re-establish the vegetative clear zone would become grassland. This area would be subject to regular mowing as part of standard operations and maintenance at Lewisville Dam. The area impacted by this activity includes 0.3 acres of riparian woodland, 1.4 acres of savanna, and 2.4 acres of upland forest. The vegetation clear zone also includes 23.0 acres of grassland that would continue as grassland and 2.4 acres of urban land that would likewise be unchanged.

Terrestrial habitat impacted by the borrow areas would be re-established under the habitat measures project element. The result would be that both Borrow Area A and B would be developed as high-quality savanna that would be actively managed moving forward to minimize tree and shrub encroachment and to foster pollinator habitat. These areas include 2.0 acres and 27.7 acres of upland forest in Borrow Area A and B, respectively, which would become savanna.

4.2.2 Detailed Habitat Projections

All seven habitat types occur in the action area under existing conditions. Actions in the action area under the Proposed Action Alternative include excavation of Borrow Sites A and B for borrow material for improvements on the dam, direct impact to transportation routes to and from the borrow sites, as well as the conduit replacement and spillway apron improvements. The habitat measures to establish pollinator habitat are also included within the action area.

Table 4-1 presents the predicted acreages for the habitat types in the action area over the next 50 years from the implementation of Proposed Action Alternative.

Table 4-1. Estimated Changes in Habitat Acreages in the Action Area over the Next 50 Years under the Proposed Action Alternative

Habitat Type	*Existing Conditions*	*Year (acres)*					
		0	*1*	*5*	*10*	*25*	*50*
Riparian Woodland	7.6	0.0	0.0	0.0	0.0	0.0	0.0
Upland Forest	48.1	0.0	0.0	0.0	14.8	28.1	52.0
Wetland	0.3	0.0	0.3	0.3	0.3	0.3	0.3
Grassland	77.2	0.0	236.2	132.9	119.6	95.7	76.6
Savanna	114.7	0.0	0.0	103.3	101.8	112.4	107.6
Lacustrine	17.7	17.7	17.7	17.7	17.7	17.7	17.7
Riverine	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Habitat Subtotal	*266.1*	*18.2*	*254.7*	*254.7*	*254.7*	*254.7*	*254.7*
Urban Area	25.1	273.0	36.5	36.5	36.5	36.5	36.5
Total	**291.2**	**291.2**	**291.2**	**291.2**	**291.2**	**291.2**	**291.2**

Riparian Woodland. The acreage of riparian woodland habitat under Proposed Action Alternative would be eliminated from the action area. During the excavation of the action area for borrow material, existing forest would be removed. The top soil would be retained, however. Following the completion of the project (Year 0), the area would be bare, but the top soil replaced, and the area seeded for grassland and savanna growth. Riparian woodland impacted by the creation of the vegetative clear zone would be permanently converted to grassland. Riparian woodland impacted by the borrow areas would be entirely converted to savanna by the habitat measures project element.

Riparian woodland impacted by temporary access, staging and stockpiling would be reseeded with native grasses and forbs and allowed to develop naturally. While a portion of the grassland habitat is expected to convert to savanna, of which a portion will then convert to upland forest, it is doubtful that riparian woodland forest would develop. As observed between the 2010 and 2014 field efforts, much of the riparian woodland is currently rapidly converting to upland forest. Furthermore, as presented in the 2014 National Climate Assessment, drier conditions in the region are anticipated to persist, and thus it is unlikely that riparian woodland would re-establish in the area within 50 years.

Upland Forest. The acreage of upland forest habitat under Proposed Action Alternative would be eliminated from the action area. During the excavation of the action area for borrow material, mature forest would be removed. The top soil would be retained, however. Following the completion of the project (Year 0), the area would be bare, but the top soil would be replaced and the area seeded for grassland. Upland forest impacted by the creation of the vegetative clear zone would be permanently converted to grassland. Upland forest impacted by the borrow areas would be entirely converted to savanna by the habitat measures project element.

Upland forest impacted by temporary access, staging and stockpiling would be reseeded with grasses and forbs and allowed to develop naturally. Once established and without controlled burns, some areas of grassland habitat would become savanna as trees become established. As trees continue to establish in new areas and canopy cover increases, more grassland would be converted to savanna, and some areas of savanna would be expected to convert to upland forest beginning after about 10 years.

Wetland. The acreage of wetland habitat under Proposed Action Alternative would be degraded in the action area during project implementation. Impacts from construction would impair water flow and quality, and impacts from construction vehicles traversing the area would damage herbaceous vegetation growth. Following the completion of the project (Year 0), the impacted area would be restored to its original topography, scarred and seeded to aid in the re-establishment of vegetation. The wetlands within the action area are general comprised of early colonizing emergent vegetation, such as cattails. The frequent flooding within the area, combined with the restoration of topography and rapid colonization by vegetation would contribute to rapid recovery of these systems within one year.

Grassland. The acreage of grassland habitat under Proposed Action Alternative would be eliminated from the action area. Following the completion of the project (Year 0), the action area would be bare, but the top soil replaced and the area seeded with native herbaceous vegetation for grassland growth. It is estimated that without controlled burns, a portion of the grassland habitat established within the areas disturbed by temporary access, stockpiling and staging would progress to savanna habitat each year as a result of ecological succession. Grasslands that are part of the embankment, vegetation clear zone, and utility rights-of-way would persist as “improved grassland.”

Savanna. The acreage of savanna habitat under Proposed Action Alternative would be eliminated from the action area. During the excavation of the action area for borrow material, trees, shrubs, and herbaceous vegetation would be removed. The top soil would be retained, however, and used during the implementation of the habitat measures project element. At Year 0, the savanna habitat established under the habitat measures would be seeded and planted with native trees, but would not yet be functioning savanna habitat. As trees and herbaceous vegetation becomes established, the habitat measures areas would be actively maintained with integrated pest management and periodic prescribed burning to maintain a healthy functioning savanna that would support a robust pollinator community.

Savanna impacted by the vegetation clear zone would be entirely converted to improved grassland. Savanna impacted by temporary access, stockpiling, and staging would be bare at project completion, but the top soil replaced and the area seeded for grassland growth. It is estimated that without controlled burns, a portion of the grassland habitat would progress to savanna habitat each year as a result of ecological succession. Similarly, a percentage of the savanna habitat would be expected to convert to upland forest each year after about 10 years. Savanna habitat is expected to persist in areas that do not retain as much soil moisture.

Lacustrine. The acreage of lacustrine habitat would be unchanged as the entirety of this habitat is within the footprint of the lake for flood stage. It is possible that the action area of lacustrine habitat would be dry more often, but maintenance of the area to ensure proper spillway functioning would preclude any substantial change in habitat from existing conditions.

Riverine. The acreage of riverine habitat would be unchanged by the Proposed Action. The habitat has a constant, controlled water supply fed directly from the outlet structure for Lewisville Lake.

4.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES

HSI values for the Proposed Action Alternative were based on the species models used for the baseline assessment (Chapter 2).

Table 4-2 presents the Proposed Action Alternative HSIs, acres, and HUs for the action area for riparian woodland, upland forest, wetland, grassland, savanna, and riverine habitat over the next 50 years. With the implementation of the Proposed Action Alternative, borrow material will be excavated from the action area, temporarily disturbing the habitat. Following the implementation of the Proposed Action Alternative (years 0, 1, and 5), the upland forest, wetland, grassland, and savanna habitat HSIs would be low because the habitats would have just been created and would take time to become established. The riparian woodland habitat is not expected to re-establish with predicted drought conditions. The HSIs for upland forest, grassland, and savanna habitats are expected to increase over time as vegetation takes root and the trees mature. Because the top soil will be replaced, and native seeding and tree planting is proposed, habitat quality in 50 years is expected to exceed existing conditions. Wetland HSIs are expected to increase over time to attain existing condition levels as the wetlands have a chance to recover and become more established.

Aquatic riverine IBIs may decrease initially after project completion, as activities at the conduit associated with PFM 2 could reduce the amount or quality of shallow riffle-pool habitat found within the upstream portion of the study area. Consequently, the existing fish-community structure could be temporarily altered or displaced by stream modifications, development, and/or construction activities associated with the Proposed Action. However, the maintained water flow at or near current flow levels would aid in the rapid recovery of the stream channel. By year 50, the aquatic riverine IBI is expected to increase due to increased regulations and technology for improvements to water quality.

Table 4-2. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the Proposed Action Alternative

Metric	*Existing Conditions*	*Year*					
		0	*1*	*5*	*10*	*25*	*50*
Riparian Woodland							
HSI	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Acres	7.6	0.0	0.0	0.0	0.0	0.0	0.0
HUs	3.42	0	0	0	0	0	0
Upland Forest							
HSI	0.30	0.00	0.00	0.00	0.00	0.04	0.41
Acres	48.1	0.0	0.0	0.0	14.8	28.1	52.0
HUs	14.43	0	0	0	0	1.12	21.32

Table 4-2. Estimated HSIs, Acreages, and HUs for Habitat Types in the Action Area over the Next 50 Years under the Proposed Action Alternative

Metric	*Existing Conditions*	*Year 0*	*Year 1*	*Year 5*	*Year 10*	*Year 25*	*Year 50*
Wetland							
HSI	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Acres	0.3	0.0	0.3	0.3	0.3	0.3	0.3
HUs	0.06	0	0.06	0.06	0.06	0.06	0.06
Grassland							
HSI	0.48	0	0.28	0.34	0.39	0.42	0.54
Acres	77.2	0.0	236.2	132.9	119.6	95.7	76.6
HUs	37.06	0	66.14	45.19	46.65	40.2	41.37
Savanna – Habitat Measures							
HSI	-	0.00	0.00	0.10	0.29	0.44	0.59
Acres	-	0.0	0.0	88.5	88.5	88.5	88.5
HUs	-	0	0	8.85	25.67	38.94	52.22
Savanna – All Other							
HSI	0.29	0.00	0.00	0.20	0.27	0.29	0.30
Acres	114.7	0.0	0.0	14.8	13.3	23.9	19.1
HUs	33.26	0	0	2.96	3.59	6.93	5.73
Riverine							
HSI	0.86	0.65	0.68	0.75	0.83	0.87	0.88
Acres	0.5	0.5	0.5	0.5	0.5	0.5	0.5
HUs	0.43	0.33	0.34	0.38	0.42	0.44	0.44

4.4 HABITAT UNITS SUMMARY

Overall HUs would increase under the Proposed Action Alternative over the next 50 years. The greatest increase would be to savanna habitat from increases in quality of that habitat, despite a slight decrease in acreage in the action area. Grassland and upland forest habitat would also increase in the action area. The greatest decrease of HUs would be to riparian woodland habitat as it will be eliminated from the action area and is not expected to recover in 50 years as a result of drought conditions expected for the area.

Table 4-3 presents the existing conditions (baseline) and the Proposed Action Alternative (Year 50) HUs for the habitat types in the action area.

Table 4-3. Estimated HU Values for Habitats within the Action Area under Baseline and Proposed Action Alternative (Year 50)

Habitat	*HUs*		
	Baseline	*Proposed Action*	*Change*
Riparian Woodland	3.42	0.00	-3.42
Upland Forest	14.43	21.32	6.89
Wetland	0.06	0.06	0.00

Table 4-3. Estimated HU Values for Habitats within the Action Area under Baseline and Proposed Action Alternative (Year 50)

Habitat	*HUs*		
	Baseline	*Proposed Action*	*Change*
Grassland	37.06	41.37	4.31
Savanna – Habitat Measures	-	52.22	52.22
Savanna – All Other	33.26	5.73	-27.53
Riverine	0.43	0.44	0.01
Total HU	**88.66**	**121.14**	**32.48**

Riparian Woodland. HUs in the action area would be eliminated from the development of the land for borrow material, as well as from the establishment of the vegetative clear zone, and the temporary access, staging, and stockpiling areas. While seeding and planting will occur, it is unlikely succession will occur at an appropriate rate to restore riparian conditions in the next 50 years given the expected drought conditions. After development, the land is expected to convert to grassland, with some succession to savanna and upland forest toward Year 50.

Upland Forest. HUs in the action area are expected to increase in 50 years under the Proposed Action Alternative due to an increase in the acreage and quality of upland forest habitat.

Wetland. HUs in the action area are expected to remain the same under the Proposed Action Alternative. Flooding events are expected to continue in the area, thus providing a constant source of water. While increased regulations and technological advances to increase water quality will likely occur, any improvements in habitat quality expected under the Proposed Action Alternative would be offset by the degradation experienced during construction.

Grassland. HUs in the action area are expected to increase in 50 years under the Proposed Action Alternative due to an increase in the acreage and quality of grassland habitat.

Savanna. HUs in the action area would increase overall. The increase is primarily from the establishment and maintenance of savanna habitat by the habitat measures project element. In addition to the established savanna habitat, a small percentage of grassland is expected to convert to savanna each year through natural successional processes. Similarly, a portion of savanna habitat would covert to upland forest each year.

It is worth noting that the habitat quality of the habitat measures areas may not be fully measureable with the currently accepted HEP models. Species of herbaceous vegetation, such as milkweed species, that are vital to major regional pollinator species may be of limited use to fox squirrel, eastern meadowlark, or cottontail, but still provide substantial increased to habitat health over all. Use of flowering shrubs further provides a food source for pollinators that is not captured in HEP modelling. Furthermore, the tree species proposed for planting in the mottes are generally slow growing, and the mottes would likely take more than 50 years to reach functional maturity and mast production. Thus, it is likely that habitat values would continue to improve for the reference species beyond 50 years, in addition to continuing to provide an oasis of quality pollinator habitat in a highly developed region. Lastly, proposed grading and contouring of the area would have the potential to also improve the diversity of plant species that would succeed in the area used for habitat measures, creating a savanna more resilient to changing environmental conditions.

Aquatic Riverine. HUs in the action area are expected to remain the same under the Proposed Action Alternative. Flooding events are expected to continue in the area, thus providing a constant source of water and restocking of fauna. While increased regulations and technological advances to increase water quality will likely occur, any improvements in habitat quality expected under the Proposed Action Alternative would be offset by the degradation experienced during construction

4.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN

The potential for threatened or endangered species, or BCC within the study area under the Proposed Action Alternative is anticipated to be the same as that under the FW/OPC; refer to Section 3.5.

The Proposed Action Alternative would create higher habitat values than both those of the existing conditions and those predicted under the FW/OPC. However, as under the FW/OPC, federally-listed species are not likely to breed or establish permanent residences in the project area under the Proposed Action Alternative.

4.6 CUMULATIVE IMPACTS

There are no additional projects expected to occur within the ROI. Therefore, no additional impacts to area habitats are expected to occur.

4.7 RECOMMENDATIONS

The planning recommendations for the implementation of the Proposed Action Alternative are the same as those recommended for the FW/OPC; refer to Section 3.6.

4.8 SUMMARY

Under the Proposed Action Alternative, overall HUs would increase. The greatest increase would be to savanna, directly resulting from the habitat measures proposed to foster quality habitat able to support regional pollinator species. This increase in HU stems from an increase in not only acreage, but also quality of the habitat. Upland forest habitat would also increase. The greatest decrease of HUs would be to riparian woodland habitat, which would be completely lost with project implementation.

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CHAPTER 5
COMPARISON OF ALTERNATIVES

Both the FW/OPC and the Proposed Action Alternative would maintain equal total acreages of habitat; however, the assemblages of habitat would be different between the two alternatives. As shown in Table 5-1, the implementation of the Proposed Action Alternative would maintain substantially more savanna than would the FW/OPC (under which much would be allowed to grow into upland forest). Much of this difference results from the Proposed Action Alternative resulting in a substantially greater loss of riparian woodland as drier conditions combined with the initial removal of habitat would likely completely remove riparian woodlands from the action area.

Table 5-1. Comparison of Habitat Acres at Year 50 within the Action Area

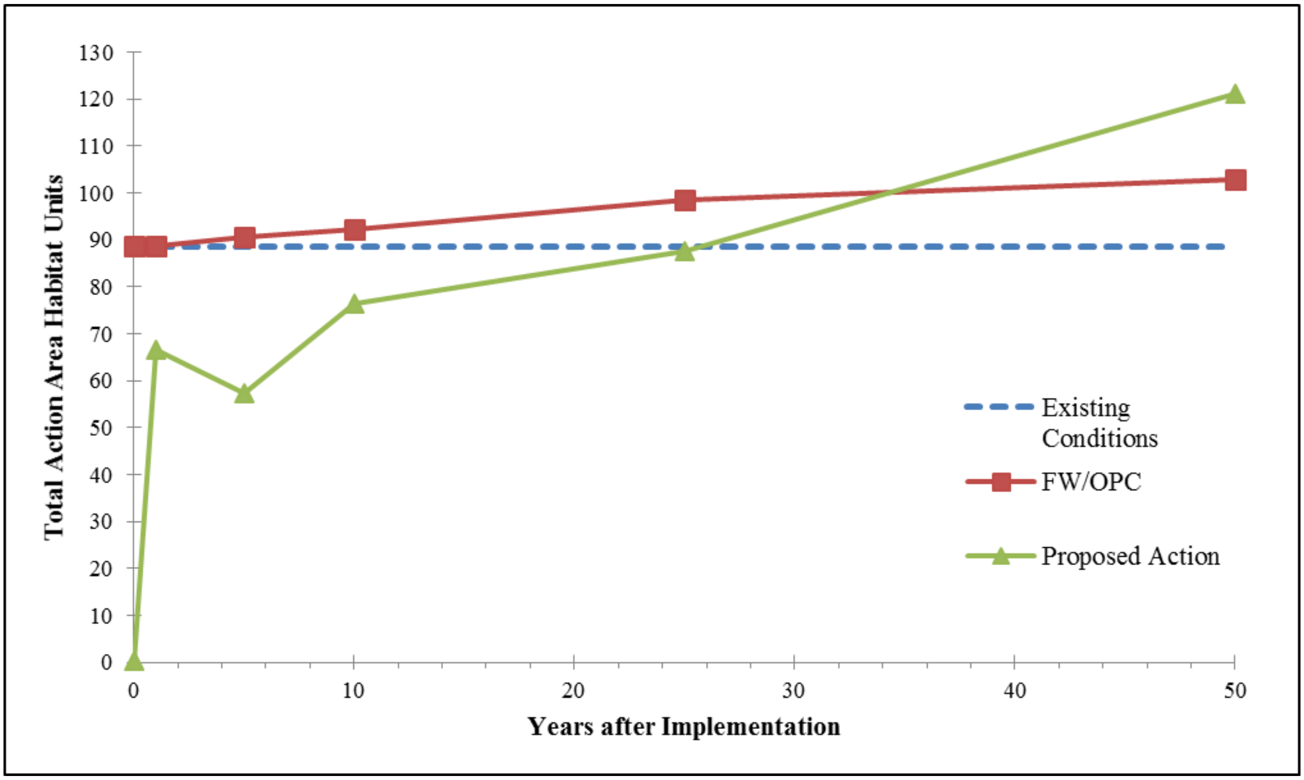
Habitat Type	*Existing Conditions*	*FW/OPC*		*Proposed Action*	
	Acres	*Acres*	*Difference*	*Acres*	*Difference*
Riparian Woodland	7.6	7.6	0.0	0.0	-7.6
Upland Forest	48.1	106.3	58.2	52.0	3.9
Wetlands	0.3	0.3	0.0	0.3	0.0
Grassland	77.2	77.2	0.0	76.6	-0.6
Savanna	114.7	56.5	-58.2	107.6	-7.1
Lacustrine	17.7	17.7	0.0	17.7	0.0
Riverine	0.5	0.5	0.0	0.5	0.0
Habitat Subtotal	*266.1*	*266.1*	*0.0*	*254.7*	*-11.4*
Urban	25.1	25.1	0.0	36.5	11.4
Total	**291.2**	**291.2**	**0.0**	**291.2**	**0.0**

Implementation of the Proposed Action Alternative would immediately and substantially reduce action area HUs. However, seeding with native seed and restoring the original topsoil would allow grassland to quickly establish. The initial increase at one year followed by a decrease at five years reflects the development of moderate quality grassland into lower quality savanna. As the savanna habitat is allowed to mature and maintenance continues, the system grows more robust and the total HUs in the action area surpass the existing conditions between 30 and 40 years post implementation.

One of the primary goals of proposed habitat measures is to establish savanna habitat that supports a robust, resilient, and diverse pollinator community. Elements of the habitat measures, such as planting of flowering shrubs and choice of specific, pollinator-favored herbaceous vegetation, are not captured by HEP modelling, but still provide substantial increased to habitat health over all. Slow-growing tree species proposed for planting in the savanna mottes are generally slow growing and would likely take more than 50 years to reach functional maturity and mast production. Thus, it is likely that habitat values would continue to improve beyond 50 years, in addition to continuing to provide an oasis of quality pollinator habitat in a highly developed region.

1 Chart 5-1 presents the trend in total HUs over time for the action area.

Chart 5-1. Projected Change in Total Habitat Units within the Action Area



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Appendix D

Clean Water Act § 404(b)(1) Analysis

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Section 404(b)(1) Analysis

Dam Safety Modifications, Lewisville Dam, Elm Fork of the Trinity River, Lewisville, Texas; National Inventory of Dams NIID: TX00008

I. PROJECT DESCRIPTION

a. Location

Lewisville Lake is located in the southern portion of Denton County in north-central Texas (refer to Lewisville Dam Safety Modification Environmental Assessment ["EA"] Figure 1-1). The lake is approximately 22 miles northwest of the City of Dallas central business district and is at the northern boundary of the City of Lewisville. The lake is approximately 12 miles long and over 5 miles wide in several locations. Lewisville Lake is located in the Trinity River basin along the Elm Fork of the Trinity River.

b. General Description

Lewisville Lake was constructed by impounding the Elm Fork of the Trinity River. Lewisville Lake is owned and operated by the U.S. Army Corps of Engineers (USACE). The major physical features of the Lewisville Dam include the embankment, outlet works, and a spillway (refer to EA Figure 1-2). The primary purposes of the lake are flood control and water supply. Associated purposes include fish and wildlife management, recreation, and hydroelectric power generation. The operation of Lewisville Lake was modified in 1988 as part of the construction of Ray Roberts Lake, located upstream of Lewisville Lake, resulting in a permanent increase of the conservation pool elevation from 515 feet above mean sea level (msl) to the current 522 feet above msl.

A total of 599,000 acre-feet of water (at conservation pool) is stored in Lewisville Lake for municipal and industrial purposes. An additional 325,700 acre-feet is provided for floodwater storage. The Cities of Dallas and Denton contributed funds for construction in order to provide citizens with a municipal water source. From 1955 through 2015, it has been estimated that the accumulated potential flood damage prevented by Lewisville Lake and Ray Roberts Lake flood control capabilities was approximately $55.6 billion (USACE 2016).

While Lewisville Dam is still functioning as designed, dam safety studies conducted in 2005 identified deficiencies based on current USACE criteria in the dam's structure.

In 2005, the USACE developed and implemented a screening portfolio risk analysis process for Dam Safety. The process identified several "potential failure modes" (PFMs), or deficiencies based on current USACE criteria, at the Lewisville Lake Project that have the potential to contribute to dam failure. There are four risk-driving PFMs connected to seepage at the embankment and spillway instability. These PFMs range in annual probability of failure from 2.12E-6 to 2.40E-4. The combined likelihood of failure is 3.11E-4.

The process also noted several non-risk-driving deficiencies. Three particularly noteworthy non-risk-driving PFMs are PFM 2, internal erosion of the embankment along the main conduit, PFM 8, shallow embankment slides from slow deformations accumulating over time, and PFM 10, erosion along utility lines that encroach on the embankment. The remainder of the identified PFMs are considered too remote in probability to be considered further.

After analysis of quantified risk reduction, USACE identified a Proposed Action alternative to carry forward for detailed analysis. The following PFMs would involve the dredge or fill of jurisdictional waters of the U.S.:

- **PFM 6: Spillway Stability.** PFM 6 refers to the spillway weir (refer to EA Figure 1-2) sliding on its foundation. When the spillway experiences strong uplift pressures from extreme pool levels, the existing instability may lead to sliding and breach of the weir. The uplift pressures acting on weir structures initiate progressive failure of spillway components and the underlying foundation materials. The probability for extreme events seen only under modeling conditions is high, and lowers as elevations reach those associated with actual pool elevations. The consequences associated with this PFM are high. The resulting risk is considered high. PFM 6 is a risk-driving measure for the Proposed Action.
  This measure would consist of installing an upstream geomembrane blanket in the approach channel of the spillway. The geomembrane would be installed approximately 3 feet below the current grade and attached to the monoliths. The membrane would extend upstream approximately 40 feet and would be covered with the material removed for its installation. The weir monoliths would be stabilized with post-tensioned anchors with an upstream inclination. The depth of the anchors is currently estimated at 70 feet. A field testing program is planned to further refine the design parameters for the anchors. A work platform or rail system would be required to install the anchors along the downstream slope of the monoliths. Piezometers would also be installed through the monoliths to monitor pore pressures.
- **PFM 7: Spillway Apron.** PFM 7 refers to spillway weir instability due to spillway apron failure during high velocities and high stagnation pressure in the existing offset joints in the apron slabs leading to undermining and sliding of the spillway weir, resulting in loss of pool. The probability for extreme events seen only under modeling conditions is high, and lowers as elevations reach those associated with actual pool elevations. The consequences associated with this PFM are high. The resulting risk is considered high. PFM 7 is a risk-driving measure for the Proposed Action.
  Two different measures are proposed to address PFM 7. First, the existing apron would be overlain with a new 12- to 18-inch thick slab. The apron overlay would create an even apron surface. The additional weight of the overlay would also decrease uplift concerns. The apron overlay would not result in any dredging or filling of jurisdictional waters of the U.S.
  The second measure to address PFM 7 is the construction of a pair of barrier walls and grade control measures downstream of the spillway. This measure aims to reduce the instability of the downstream dam structure due to channel scour contributing to a risk of dam failure.
  The barrier wall construction is currently planned to be completed by drilling 36-inch diameter shafts on 42-inch centers. The shafts would be reinforced and filled with concrete. A concrete cap would be constructed on top of the shafts. The cap would be 3 feet high and 4 feet wide. The depth of the shafts would be 25 feet below the maximum scour depth predicated in the outlet channel, which is approximately 90-feet. The walls would span the entirety of the original outlet channel. The wall immediately abutting the apron would be entirely underground. The wall downstream of the apron would also be approximately 90 feet deep, but would extend above ground approximately 3 to 4 feet, and would have a riprap approach of up to approximately 25 feet. The downstream side of the wall area would have a 20-foot flat section and then slope down on a 10:1 slope to connect with the existing channel grade. The flat section may be utilized as a low-water crossing; the 10:1 slope would be protected by rock riprap. The distance downstream is anticipated to be less than 100-feet from the centerline of the barrier wall.

- **PFM 2: Outlet Conduit Erosion.** PFM 2 refers to the risk associated with internal erosion of the Lewisville Dam embankment along the outlet conduit. There are no indications of any near-term concerns at the conduit, so the probability is remote. However, the consequences would be high if failure were to occur. The risk associated with this PFM is relatively low, but measures to address it are included to take advantage of construction and design efficiencies.
  This measure would surround the existing conduit with a fine horizontal filter and two outlets on each side. The filter would extend approximately 50 feet upstream of the conduit. The fine filter would extend downstream along both sides of the basin wall and convert to a two-stage filter along the weep holes in the basin walls. The two-stage filter would allow the weep holes to discharge any collected seepage and prevent the piping of the fine filter through the weep holes.
- **PFM 8: Slope Stability Improvement.** PFM 8 refers to the instability of the upstream embankment slope contributing to a risk of slope failure that would lower the top of dam at the site of the slide. The probability associated with this PFM is remote, but measures to address it are included to take advantage of construction and design efficiencies, since consequences would be moderate to high.
  This measure would consist of installing an upstream embankment berm on parts of the embankment. The crest modification would occur along the same embankment. The embankment berm would be constructed to an elevation of 537.0 with a 15-foot top width and 4:1 upstream slope. The embankment berm would have rock riprap protection on the upstream slope to protect against wave erosion. The fill for the embankment berm would come from the proposed borrow locations. Additional analysis would be completed to determine the need for lime treatment of this material. The crest modification would include removing the existing pavement and removal of approximately 6 feet of the embankment. The material from the embankment would be lime treated and replaced. The crest would be sloped to the downstream side and a geomembrane added prior to repaving the crest road. Further analysis would determine the depths of the existing embankment that would receive the lime treatment.

c. Purpose and Authority

The purpose of the proposed project is to minimize the potential for dam failure by remediating the seepage deficiencies, spillway weir instability, and apron failure at the Lewisville Dam. This remediation would provide for safe and effective functioning of the Lewisville Dam at authorized capacity, while reducing the risk to the downstream public to tolerable levels.

Lewisville Dam and Lake was initially authorized by the Rivers and Harbors Act of 1945 (Public Law 79-14) for improvements on the Trinity River and tributaries for navigation, flood control, and allied purposes. The Water Supply Act of 1958, as amended, (43 USC § 390b) provided for storage and made it available for municipal and industrial water supply. The Rivers and Harbors Act of 1965 (Public Law 89-298, 79, Stat. 1091) modified the authorization provided by Rivers and Harbors Act of 1945 by requiring a re-evaluation report for any navigation features. The Flood Control Act of 1970, Section 221 (42 USC §§ 1962d-5b) provides guidance with regard to payments for conservation storage. Engineering Regulation 1110-2-1156 (final March 31, 2014) prescribes the guiding principles, policy, organization, responsibilities, and procedures for implementation of risk-informed dam safety program activities and a dam safety portfolio risk management process within USACE. When unusual circumstances threaten the integrity of a structure and the safety of the public, USACE has the authority to take expedient actions, require personnel to evaluate the threat, and design and construct a solution.

The USACE is the action proponent and has determined that while Lewisville Dam is still functioning as designed, critical weaknesses identified in the 2005 dam safety studies warrant remediation. The EA, to which this Section 404(b)(1) analysis is appended, was prepared by USACE Fort Worth District to determine the technical soundness and environmental acceptability of the proposed project and to disclose any potential impacts associated with project implementation.

d. General Description of Dredged or Fill Material

(1) General Characteristics of Material

The material to be temporarily removed and then replaced upstream of the spillway for PFM 6 is Altoga silty clay, which is deep, clayey, gently sloping soil found on high terraces of major streams.

Construction associated with PFM 2 would result in temporary impacts to the outlet conduit; however, there would be no fill or permanent impacts to the outlet conduit. Following installation of the filter, the outlet conduit would be returned to its current condition.

The material that would be used for fill upstream of the Lewisville Dam for PFM 8 would be from Borrow Sites A and B that are located within the Ovan clay soil type. Ovan clay is deep, nearly level soil found on flood plains along major streams; the soil is moderately well drained with slow runoff and very slow permeability.

(2) Quantity of Material

Approximately 2,500 cubic yards of material would be removed for installation of the geomembrane for PFM 6 then replaced following installation.

There would be no dredged or fill material placed in waters of the U.S. for construction associated with PFM 2.

Approximately 325,000 cubic yards of material from Borrow Sites A and B would be used for the construction of an upstream embankment berm along a portion of the dam under PFM 8. The total amount that would be within Lewisville Lake would be determined in the course of design.

Stone rip rap would be utilized for the downstream barrier wall for PFM 7 on the approach and downstream of the wall and low water crossing for energy dissipation and erosion protection.

(3) Source of Material

Construction associated with PFM 6 would involve the installation of a geomembrane blanket 3 feet below grade in an area upstream of the spillway weir and within Lewisville Lake, which is a jurisdictional water of the U.S. The geomembrane would extend upstream approximately 40 feet. Material would be removed from the site and stockpiled nearby; the geomembrane would be installed; and then the geomembrane would be covered with the material removed for its installation as soon as it is installed.

Fill for PFM 8 would come from upland areas within Borrow Area A (56.4 acres) and Borrow Area B (32.1 acres). The borrow areas were sited with input from lake office personnel and the management of the Lewisville Lake Environmental Learning Area (LLELA) to minimize environmental and recreational impacts. The borrow areas are shown on Figure 1-2.

e. Description of the Proposed Discharge Site(s)

(1) Location

For PFM 6, the discharge site is located upstream of the spillway weir; for PFM 8 the discharge site is located along the upstream side of a portion of the Lewisville Dam. Surplus and/or unsuitable material would be removed from the project area and deposited into an upland disposal site that would not impact waters of the U.S. If Lewisville Lake water levels are inundating the construction area upstream of the spillway weir or dam, a cofferdam would be used so that construction would occur under dry conditions. For PFM 2, there would be temporary impacts due to construction along the outlet conduit and there would be no fill or permanent impacts to the outlet conduit. For PFM 7, the discharge site would be approximately 1,000 feet downstream of the spillway apron.

(2) Size

Approximately 0.5 acre, 5.1 acres, and 4.9 acres would be potentially disturbed by construction activities associated with PFM 6, PFM 8, and PFM 7 respectively.

(3) Type of Site

The area upstream of the spillway (PFM 6) is classified as freshwater emergent wetlands; the area downstream of the spillway (PFM 7) is also classified as freshwater emergent; the area downstream of the outlet conduit (PFM 2) is classified as riverine; and the area on the upstream side of Lewisville Dam (PFM 8) is classified as open waters associated with Lewisville Lake by the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory. All of these areas are considered jurisdictional waters of the U.S. If Lewisville Lake water levels are inundating the construction area upstream of the spillway weir or dam, a cofferdam would be used so that discharge would not occur in open water.

(4) Type(s) of Habitat

Lacustrine habitat is on the upstream side of the spillway (PFM 6) and Lewisville Dam (PFM 8) and is irregularly inundated, varying with lake level. The area is also subject to periodic dredging for maintenance by USACE. Aquatic riverine habitat is downstream of the outlet conduit (PFM 2). Freshwater emergent wetland habitat occurs in the spillway channel (PFM 7) when water is present, however currently the area is largely void of vegetation and highly disturbed by substantial scour following recent flow events.

(5) Timing and Duration of Discharge

Discharges would occur over the entire construction period which is estimated to be 3 years for PFM 6, 1 year for PFM 2, 1 year for PFM 8, and 3 years for PFM 7. It is anticipated that once the project begins, there would continual construction until completion.

f. Description of Disposal Method

Equipment used to excavate and to backfill the area upstream of the spillway for PFM 6 and around the outlet conduit for PFM 2 and to install the berm for PFM 8 could include, but not be limited to excavators, front end loaders, grade-alls, possibly with rippers, other heavy excavation equipment including bulldozers and dump trucks.

II. FACTUAL DETERMINATION

a. Physical Substrate Determinations

(1) Substrate Elevation and Slope

For PFM 6, approximately 3 feet of material would be removed to install the geomembrane upstream of the spillway and then replaced. The existing substrate elevation and slope of the area upstream of the spillway would remain the same under the proposed action.

For PFM 2, construction would result in temporary impacts to the outlet conduit as the repairs are implemented, and would be returned to its current condition.

For PFM 8, the embankment berm would be constructed to an elevation of 537.0 with a 15-foot top width and 4:1 upstream slope. The embankment berm would have rock riprap protection on the upstream slope to protect against wave erosion. This proposed fill to repair the berm would return the dam cross section, and therefore the substrate elevation, to the original design specifications under the proposed action.

For PFM 7, the installation of the barrier walls would replace existing disturbed substrate at each location. The downstream barrier wall would be located in the man-made spillway connector channel.

(2) Sediment Type

The sediment/soils upstream of the spillway (PFM 6) and Lewisville Dam (PFM 8) are silty clay and clay loam, respectively. For PFM 6 the same material removed for installation of the geomembrane would be replaced so there would be no change in sediment type. For PFM 8 the substrate would have rock riprap protection on the upstream slope to protect against wave erosion. This would be consistent with adjacent sections of the berm. For PFM 2, the outlet conduit channel would remain in place and there would be no change in sediment at the location. For FPM 7, the sediment would be temporarily disturbed by drilling the holes for the wall shafts.

(3) Dredged/Fill Material Movement

The geomembrane would provide long term stabilization of the area upstream of the spillway (PFM 6). For PFM 2, the outlet conduit would be returned to its current condition. The embankment berm would have rock riprap protection on the upstream slope to protect against wave erosion (PFM 8) and drilled material from the shaft installation would be removed (PFM 7). These measures would ensure that only minor movement of fill would occur after construction.

(4) Physical Effects on Benthos

The existing benthos upstream of the spillway (PFM 6) would be temporarily impacted and expected to then recover to preexisting conditions once construction is complete. There would be minimal to no disturbance to the existing benthos around construction of the outlet conduit (PFM 2). The existing benthos upstream of the Lewisville Dam (PFM 8) would be permanently impacted due to repairs to the berm. No impacts to benthos associated with PFM 7 are anticipated. The downstream barrier wall location is designated as emergent wetland by USFWS National Wetlands Inventory, but observations of the site over the last 3 years indicate that the site does not support an emergent wetland community since flows are highly ephemeral. Under current conditions, there is no viable benthic community.

(5) Other Effects

Implementation of the proposed action would result in no other adverse effects.

(6) Actions Taken to Minimize Impacts

PFM 6 would install a geomembrane apron upstream of the spillway to prevent uplift pressure migrating along the weir foundation. Reduced uplift pressure would help stabilize the concrete monoliths of the spillway. This measure could offer some redundancy but does not substantially reduce risk on its own. It may be combined with the buttress or anchor stability measures.

PFM 2 would address the risk associated with internal erosion of the Lewisville Dam embankment along the outlet conduit. The selected design option has the smallest impact footprint and avoids significant excavation.

PFM 8 would address the instability of the upstream embankment slope contributing to a risk of slope failure that would lower the top of dam at the site of the slide. The probability associated with this PFM is remote, but measures to address it are included to take advantage of construction and design efficiencies, since consequences would be moderate to high. This measure would consist of installing an upstream embankment berm on parts of the embankment. The crest modification would occur along the same embankment.

PFM 7 would address instability of the concrete dam structure and downstream spillway channel by providing additional reinforcement to the concrete apron and creating less erosive water velocities downstream that would contribute to channel instability.

PFM 6, 2, 8, and 7 along with other PFMs identified in the EA, would provide for safe and effective functioning of the Lewisville Dam at authorized capacity, while reducing the risk to the downstream public to tolerable levels. PFM 6 results in temporary impacts and returns the physical substrates to preexisting conditions. For PFM 2, the outlet conduit would be returned to its current condition. PFM 8 would return the dam cross section to original design specifications.

b. Water Circulation. Fluctuation and Salinity Determinations

(1) Water. Consider Effects on:

(a) Salinity

The project would not impact salinity of Lewisville Lake or downstream waters.

(b) Water Chemistry

The project would not impact water chemistry of Lewisville Lake or downstream waters.

(c) Clarity

Temporary disruption to water clarity is expected during construction. After construction is complete, water clarity would be the same as it is currently.

(d) Color

No changes in color are anticipated following construction.

(e) Odor

No changes in odor would occur following construction.

(f) Taste

Lewisville Lake is used as a source of potable water. If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. Therefore, construction would not affect taste of the water.

(g) Dissolved Gas Levels

No change in dissolved gas levels would occur following construction.

(h) Nutrients

No change in nutrient levels would occur following construction.

(i) Eutrophication

No changes as a result of implementation of the proposed project would impact eutrophication of the aquatic system of Lewisville Lake or downstream waters.

(2) Current Patterns and Circulation

(a) Current Patterns and Flow

Construction would occur upstream of the spillway (PFM 6), along the edge of the dam (PFM 8), or in the downstream spillway channel (PFM7). In the event that flow occurs over the spillway during construction, there would be no obstruction to current patterns and flow. The construction along the outside of the outlet conduit (PFM 2) would not affect flow within or downstream of the conduit channel. Overall, the proposed project would not alter the design or function of the Lewisville Dam or associated features and current patterns and flow would remain the same as under existing conditions.

(b) Velocity

Construction would occur upstream of the spillway (PFM 6), along the edge of the dam (PFM 8), or in the downstream spillway channel (PFM 7). In the event that flow occurs over the spillway during construction, there would be no restriction that would affect flow velocity. The construction along the outside of the outlet conduit (PFM 2) would not affect flow velocity within or downstream of the conduit channel. Overall, the proposed project would not alter the design or function of the Lewisville Dam or associated features and velocity would remain the same as under existing conditions.

(c) Stratification

Construction would occur upstream of the spillway (PFM 6), along the edge of the dam (PFM 8), or in the downstream spillway channel (PFM 7). In the event that flow occurs over the spillway during construction, there would be no obstruction to current patterns and flow. The construction along the outside of the outlet conduit (PFM 2) would occur downstream of Lewisville Lake so would not affect stratification. Overall, the proposed project would not alter the design or function of the Lewisville Lake Dam or associated features and stratification would remain the same as under existing conditions.

(d) Hydrologic Regime

Within the Trinity River Basin there are eight projects operated as a multi-purpose system by the USACE: Bardwell, Benbrook, Grapevine, Joe Pool, Lavon, Lewisville, Navarro Mills, and Ray Roberts. Several lakes not operated by USACE are also part of the system: Bridgeport Reservoir, Eagle Mountain Lake, Lake Worth, Lake Ray Hubbard, Mountain Creek Lake, Cedar Creek Lake, Richland Chambers Lake, and Lake Livingston. Lewisville Lake is operated as a unit in the system for development of the water resources of the Trinity River Basin in Texas. Lewisville Lake is primarily regulated for control of floods on the Elm Fork of the Trinity River. Located upstream of the Study Area, Ray Roberts Lake is operated with Lewisville Lake to provide added flood risk management and conservation storage.

The topography, soils, and typical rainfall patterns of the Lewisville watershed lead to rapid runoff and sharp-crested inflow hydrographs. Floods in this region can occur at almost any time of the year. Historic storms have often been preceded by scattered rainfall resulting in a saturated watershed prior to the main rainfall event. Flood control releases from Lewisville Dam are coordinated with releases from existing lakes for maximum flood protection in the Trinity River Basin. Flood storage in the eight projects operated by USACE in the Trinity River System is released as soon as downstream channel capacity is available. The lake levels are lowered to their conservation pools at the earliest possible date in order to provide flood protection against future storms. Controlled releases from Lewisville Lake are made at a rate such that when they are combined with flows from downstream areas they will not exceed the controlled stages and channel capacities. The following summarizes lake operation for the range of lake level elevations:

1. **Lake elevation at or below 522.0 feet (Top of Conservation Pool)**. Releases for water supply will be made upon request from the City of Dallas or the City of Denton. Releases combined with local flow downstream should not exceed 5,000 cubic feet per second (cfs) on the Elm Fork at the Carrollton Gage. This release was increased from 4,000 cfs as part of the Interim Risk Reduction Measures Plan in 2011. For water quality purposes releases less than 650 cfs will be discharged through the multi-level sluice gate outlet. Releases in excess of 650 cfs will be discharged by using a combination of both the multi-level sluice gate outlet and the flood control gates.
2. **Lake elevation between 522.0 feet and 523.0 feet**. If the lake elevation is between 522.0 feet (top of conservation pool) and forecasted to remain below 523.0 feet (10% of flood pool), flood releases will be made not to exceed 4,000 cfs. This is done to evacuate floodwater as quickly as possible. These releases will be coordinated with other flows in the Elm Fork system so as not to exceed 4,000 cfs at the Carrollton gage on the Elm Fork and 13,000 cfs at Dallas, 15,000 cfs at Rosser, and 24,000 cfs at Oakwood gages on the main channel of the Trinity River.
3. **Lake elevation between 523.0 feet and 526.0 feet**. If the lake elevation is forecasted to rise to between elevation 523.0 feet and elevation 526.0 feet, releases when combined with downstream flow should not exceed 5,500 cfs at the Carrollton gage on the Elm Fork, and on the Trinity River at Dallas, Rosser, and Oakwood gages the control flows are 13,000, 15,000, and 24,000 cfs, respectively.
4. **Lake elevation between 526.0 feet and 532.0 feet**. If the lake elevation is forecast to rise to between elevation 526.0 feet and elevation 532.0 feet (top of flood pool), releases should not cause the flow to exceed 7,000 cfs at the Carrollton gage on the Elm Fork, and at Dallas, Rosser, and Oakwood gages the control flows are the same as above.
5. **Lake elevation above 532.0 feet**. Gated releases when combined with spillway discharges should not exceed the flows stated above for elevation levels between 526.0 feet and 532.0 feet.

During construction along the outlet conduit (PFM 2), the lake operations identified above would not be affected as the outlet conduit would continue to be fully functional during construction.

(e) Normal Water Level Fluctuations

At Lewisville Lake, the top of the conservation pool is at elevation 522 feet above msl year round. Conservation releases are made at the request of the City of Dallas, and are usually made through the low flow system. However, water supply releases can be made through the main conduit depending on the volume requested. During flood events, if the lake is below the top of flood pool (532 feet above msl), floodwater is retained until the river downstream has receded within its banks. Flood control releases from Lewisville Dam are coordinated with releases from seven other existing USACE dams for maximum flood protection in the Trinity River Basin. If the lake level rises above 532 feet, the floodwater flows over the uncontrolled spillway. Lewisville Lake has overtopped the spillway on seven occasions during the life of the project, the last of which occurred in May 2015.

(f) Salinity Gradients

No changes to salinity gradient would occur.

(g) Actions That Will Be Taken to Minimize Impacts

Appropriate BMPs will be utilized to minimize erosion and sedimentation during construction.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

Only minor temporary increases in suspended particulates and turbidity levels would occur during construction. A SWPPP will be prepared in accordance with compliance TXR150000, which would outline site-specific BMPs to minimize erosion and the potential for sediment to enter receiving waters during construction activities. If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column

(a) Light Penetration

Changes to light penetration would occur during construction associated with minor turbidity increases. Appropriate erosion and sedimentation controls would be implemented to reduce impacts to Lewisville Lake and downstream waters. If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. After project completion and stabilization, the clarity of the stream would return to preconstruction levels.

(b) Dissolved Oxygen

Temporary lowering of dissolved oxygen could occur during construction, but would be localized and temporary in both time and extent.

(c) Toxic Metals and Organics

No water testing was conducted in the immediate proposed project area and no data was identified to provide information on water quality measures. The proposed project would not result in the introduction of additional toxicants into Lewisville Lake or downstream waters over those that currently exist.

(d) Pathogens

No pathogens would be added to the water column as a result of this project.

(e) Aesthetics

Implementation of the proposed project would have no effect on the natural aesthetics in the area.

(f) Others as Appropriate

No other effects to water column are anticipated

(3) Effects on Biota

Displacement of local biota would occur during construction as mobile species would migrate to adjacent habitats. Although sessile species would be impacted during construction activities, over time and upon project completion, it is anticipated that biota will recolonize the project site at the same diversity and density as currently present under pre-project conditions. The construction along the outside of the outlet conduit (PFM 2) would not affect water flow within or downstream of the conduit channel so would not affect biota. Installation of the downstream barrier wall would take place in an area mapped as emergent wetlands by the USFWS National Wetlands Inventory. However, aerial photography and site visits confirm that the area is largely devoid of vegetation. Biota would be expected to be very limited in this section of the spillway channel, as the flows are ephemeral in nature.

(a) Primary Production, Photosynthesis

The area upstream of the spillway (PFM 6) is infrequently inundated and has limited aquatic vegetation. The area along the upstream side of the dam (PFM 8) also has limited aquatic vegetation and very little vegetation is located on the berm. As a result, little aquatic vegetation would be lost from the project site during implementation of the proposed project, and the loss is considered less than significant.

(b) Suspension/Filter Feeders

If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. Suspension/filter feeders would be would temporarily disperse to undisturbed areas of Lewisville Lake and then return following completion of construction. BMPs would be established to control erosion and sedimentation that may otherwise impact filter feeders. There would be very limited loss of suspension/filter feeders as a result of project construction, but the loss would be less than significant.

(c) Sight Feeders

If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. Sight feeders would be temporarily displaced during construction activities. BMPs would be established to control erosion and sedimentation that may otherwise impact sight feeders. Once the construction is complete, sight feeders would repopulate to the current extent. No net loss of sight feeders is anticipated as the result of the proposed action.

(4) Actions Taken to Minimize Impacts

If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. Appropriate BMPs will be utilized to minimize erosion and sedimentation during construction.

d. Contaminant Determinations

The Lewisville Dam low flow outlet works was identified in the May 2011 EDR Corridor Study map (EDR 2011) as a location (Site 2) where one 1,000-gallon gasoline underground storage tank (UST) and one 1,000-gallon diesel UST were removed in 1991. EDR identified several commercial sites near Sites 4 and 6, which are between ¼ and ½ mile from the toe of the dam. None of these listings are indicative of an offsite release of hazardous materials or petroleum products to the environment except the Leaking Petroleum Storage Tank listing, in which minor soil contamination was reported. Two 8,000-gallon gasoline USTs, one 4,000-gallon diesel UST, and one 1,000-gallon used oil UST were removed from the ground at this site and Final Concurrence, Case Closed status was granted by the TCEQ in 1992, indicating no further action is required and no residual onsite or offsite environmental impacts should be expected. No other locations were identified on either the May 2011 and March 2014 EDR Corridor Study maps which could have potentially impacted the toe of the dam in the Project Area or the borrow pits.

Potentially contaminated areas or hazardous materials could be encountered during demolition or constructed-related activities. A Contingency Action Plan would contain protocol for encountering any potentially contaminated or hazardous material during construction. Any such material would be handled in accordance with all federal, state, and local laws to ensure contractors, USACE personnel, the public, and the environment are not exposed to unacceptable levels of contaminated soils, groundwater, and any toxic and/or hazardous materials or wastes. If any suspected contaminated media (e.g., soil, groundwater) were encountered during the course of site preparation (e.g., clearing, grading), site development (e.g., excavation), or demolition under the Proposed Action, work in that area would cease immediately and the Project Manager and the TCEQ would be notified, as appropriate per state regulations. The proposed project would not result in the exposure of biota in Lewisville Lake or downstream waters to any toxicants.

e. Aquatic Ecosystem and Organism Determinations

The construction along the outside of the outlet conduit (PFM 2) would not affect water flow within or downstream of the conduit channel so would not affect the aquatic ecosystem.

(1) Effects on Plankton and Nekton

Plankton and nekton that currently occupy the sediments and water columns in the areas upstream of the spillway (PFM 6) and dam (PFM 8) would be adversely impacted by fill activities, but it is anticipated that it will not take too long for these species to recolonize these areas following construction. Therefore, no net loss of plankton and nekton is anticipated.

(2) Effects on Benthos

No additional effects other than those previously discussed were identified.

(3) Effects on Aquatic Food Web

Temporary disruptions to the food web would occur during construction. However, following construction it is anticipated that limited species at all levels of the food web will return to the same level as currently exists. Therefore, no net loss of species or negative impacts to trophic levels are anticipated as the result of the proposed action.

(4) Effects on Special Aquatic Sites

(a) Sanctuaries and Refuges

No fish and wildlife sanctuaries or refuges occur within the project area.

(b) Wetlands

Construction associated with PFM 6 would involve the installation of a geomembrane blanket below grade in an area upstream of the spillway weir and within Lewisville Lake, which is a jurisdictional water of the U.S. The geomembrane would extend upstream approximately 40 feet; however, these impacts would be considered temporary as the geomembrane would be covered with the material removed for its installation as soon as it is installed. If Lewisville Lake water levels are inundating the construction area upstream of the spillway weir, a cofferdam would be used to minimize potential impacts that would have occurred if lake lowering were required.

Construction associated with PFM 2 would result in temporary impacts to the outlet channel connecting to the Elm Fork Trinity River, which is a jurisdictional water of the U.S. However, there would be no fill or permanent impacts to the outlet channel. Following installation of the filter, the outlet channel would be returned to its current condition.

Construction associated with PFM 8 would involve the construction of an upstream embankment berm along a portion of the dam. This would result in permeant fill of jurisdictional waters of the U.S. associated with Lewisville Lake; however, this proposed fill material would return the dam cross section to original design specifications. There would also be temporary impacts associated with in-water construction. If Lewisville Lake water levels are inundating the construction area upstream of the dam, a cofferdam would be used to minimize potential impacts that would have occurred if lake lowering were required. Direct impacts would not be considered significant, as this proposed fill material is considered maintenance of an existing serviceable structure to original design specifications and any impacts would be minimized and avoided, as appropriate.

Construction associated with PFM 7 would involve the placement of the barrier wall and any outlet protection within an emergent wetland area as designated by the USFWS National Wetlands Inventory, which under normal circumstances would be considered jurisdictional water of the U.S. However these “jurisdictional areas” occur in a disturbed, man-made spillway channel that does not support a wetland community due to a lack of consistent water flows.

(c) Mud Flats

No mud flats would be impacted in the project area.

(d) Vegetated Shallows

No vegetated shallows would be impacted in the project area.

(e) Coral Reefs

No coral reefs occur in the project area.

(f) Riffle and Pool Complexes

No riffle or pool complexes would be impacted in the project area.

(5) Threatened and Endangered Species

The project would not affect any federally listed threatened or endangered species.

(6) Other Wildlife

Wildlife inhabiting the aquatic and riparian habitats within the project reach would be temporarily displaced during construction. Mobile species would migrate to adjacent habitats. Although sessile species would be impacted during construction activities, they would be expected to return to suitable habitat areas following construction.

(7) Actions to Minimize Impacts

If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. Appropriate BMPs will be utilized to minimize erosion and sedimentation during construction.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination

If Lewisville Lake water levels are inundating the construction area upstream of the spillway (PFM 6) or dam (PFM 8), a cofferdam would be used so that in-water construction would not occur. Therefore, most fill would occur within areas while in a dry state and only minimal mixing would occur unless a large storm event occurs during project construction. BMPs, such as silt curtains, will be implemented to reduce impacts. Disposal of surplus material would occur at an offsite upland location that is not within waters of the U.S.

(2) Determination of Compliance with Applicable Water Quality Standards

Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than 1 acre would be required to comply with the Construction General Permit (TXR150000), per the requirements of the TCEQ TPDES program as administered by the TCEQ. Construction activities that result in land disturbance of equal to or greater than 1 acre and less than 5 acres of land are considered “small construction activities.” Construction activities that result in land disturbance of equal to or greater than 5 acres of land are considered “large construction activities.” Construction activities as part of this project would disturb more than 5 acres of land, and would therefore comply with the requirements of a large construction activity. Before construction, a NOI would be submitted to TCEQ for compliance with the General Stormwater Permit for Construction Activities and a detailed SWPPP would be developed for the project.

Construction activities may result in the generation of pollutants including sediment and other construction-related constituents (such as nutrients, trace metals, oil and grease, miscellaneous waste, and other toxic chemicals). Without controls, the pollutants could potentially enter receiving waters. The SWPPP would outline site-specific BMPs in accordance with TXR150000, which would minimize erosion and the potential for sediment and other pollutants to enter receiving waters during construction activities. BMPs include schedules of activities, prohibitions of practices, maintenance procedures, structural controls, local ordinances, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas (TCEQ 2013).

BMPs such as cofferdams, turbidity curtains, and appropriate dewatering measures would be implemented for in-water work. Additional erosion control and stabilization practices may include but are not limited to: establishment of temporary or permanent vegetation, mulching, geotextiles, sod stabilization, vegetative buffer strips, protection of existing trees and vegetation, slope texturing, temporary velocity dissipation devices, flow diversion mechanisms, silt fencing, sediment traps, the application of water sprays, and the prompt revegetation of disturbed areas. These measures would reduce potential impacts to water quality. Implementation of sediment and erosion controls during construction activities would maintain runoff water quality at levels comparable to existing conditions.

Following construction, routine maintenance and repairs of the dam facilities under the proposed action would comply with all applicable CWA and TCEQ requirements and regulations.

Therefore, implementation of the proposed action would result in minor impacts to water quality.

(3) Potential Effects on Human Use Characteristic

(a) Municipal and Private Water Supply

The City of Dallas and City of Denton utilize water from Lewisville Lake for municipal water supply. However, implementation of the proposed project would have no impact on the local water supply.

(b) Recreational and Commercial Fisheries

There would be no lake lowering required under the proposed project and thus no impacts to lake use would occur. Fishing activities that occur downstream of the conduit may be interrupted during the construction phase for PFM 2 but impacts would be temporary and short-term.

(c) Water Related Recreation

Construction activities associated with the PFMs would not be expected to directly affect recreational areas. Public access to recreational areas of Lewisville Lake as well as trails, parks, all other recreational amenities within the Project Area would be maintained. Construction vehicles accessing and leaving the site(s) would use the main access roads. To avoid interruption to public access of recreational areas and resources, a temporary access road would be in place prior to construction and would run parallel to the existing main access roads.

Daily operations of Lewisville Dam would not change the current conditions of recreational resources or future growth of resources in the area. Beneficial impacts to recreational resources would result through increased stability of the dam reducing potential flood impacts that have closed parks and limited use of Lewisville Lake for recreational purposes in the past. Therefore, no significant operation impacts to recreational resources would occur with implementation of the proposed action.

(d) Aesthetics

The Proposed Action includes noticeable short-term visual features such as staging, borrow, and stockpile areas; haul roads; and platforms. Construction-related visual impacts would include the presence of construction equipment and vehicles, glare, worker activity, dust, and material storage and movement. These visual impacts would be temporary, lasting only the duration of the construction period. The construction would be localized as individual PFM elements are implemented; not all elements would be constructed at the same time. Therefore, the location of the visual impact would be minor and highly variable throughout the construction period.

The proposed borrow sites would be cleared of vegetation and visually change from a combination of savanna and dense forests. In addition, a 50-foot vegetation clear zone along the toe of the Lewisville Dam embankment would be established. Sections of this clear zone are currently densely forested and therefore the current visual environment would also be altered.

After the dam safety measures have been implemented, the USACE would contour the borrow areas and clear zone to resemble the natural surrounding terrain. Both areas would be seeded with native grasses and forbs. In addition, plantings of mast-producing trees and flowering shrubs would be added on the disturbed lands associated with the borrow areas. The plantings would be intended to create a landscape more consistent with historic prairie and savanna conditions than existing conditions. Therefore, over the long-term, visual impacts may be improved.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

The U.S. Army Engineer Research and Development Center (ERDC) operates Lewisville Aquatic Ecosystem Research Facility (LAERF) immediately downstream of the Lewisville Dam on USACE project property. LLELA organizations manage the area downstream of the dam for education and recreation, and manage mitigation areas (such as the Bittern Marsh) and some prairie restoration undertakings.

Under the Proposed Action, the Project Area would be largely unchanged and operations and land use at LAERF and within LLELA would be mostly unaffected. Construction vehicle access to and collection of material from the borrow pits would be staged to minimize disruption of the LLELA organizations' normal daily operations. On-going coordination would occur with all municipalities, utilities, and stakeholders (including LAERF and LLELA organizations) regarding details of construction (schedule) and alternate public access roads during the construction process.

An experimental pond facility developed by the USACE Aquatic Plan Control Research Program, and LAERF supports studies on biology, ecology, and management of aquatic and wetland plants. Construction would affect wetland areas at these associated developed sites and seepage areas; however, these wetland areas are considered non-jurisdictional. Some non-jurisdictional wetland areas would be permanently affected due to alteration of water source (i.e., through modification or control of seepage). As a result of the proposed activities, some ponds currently being used at the LAERF facility would no longer function; however, changes in the water lines servicing LAERF would allow water to reach currently dry ponds and bring them back into an operable status.

g. Determination of Cumulative Effects on Aquatic Ecosystem

There are no additional projects expected to occur within the Project Area. LAERF and LLELA organizations would continue operating within the Project Area, including on-going habitat restoration operations. Therefore, beneficial impacts to area habitats are expected to occur.

h. Determination of Secondary Effects on Aquatic Ecosystem

No secondary effects on the aquatic ecosystem were identified

i. Summary of Section 404(b)(1) Analysis

In accordance with the guidelines in Engineering Regulation 1110-2-1156, the comprehensive alternative formulation process resulted in the identification of multiple potential remediation measures for each PFM. Each combination of remediation measures addresses all risk-driving PFMs, but uses different groups of measures to do so. The evaluation of PFM measures was then focused to risk reduction and cost of implementation. Based on these elements, the project team determined that the Proposed Action for further analysis would be comprised of the following dam safety measures:

- PFM 4A: Downstream Inverted Filter Berm with Collection Trench
- PFM 4B: Downstream Inverted Filter Berm with Collection Trench
- PFM 6: Post-Tensioned Anchors with Upstream Geomembrane Cutoff
- PFM 7: Overlay and Grade Control/Barrier Walls
- PFM 2: Conduit Filter

- PFM 8: Slope Stability Improvements

Final alternatives evaluated included only the proposed action and no action alternatives.

While implementation of the proposed action plan does include the placement of fill material within jurisdictional waters of the U.S., this disposal would not violate established state water quality standards or the Toxic Effluent Standards of Section 307 of the Clean Water Act, nor harm any endangered species or their critical habitat. Implementation of the proposed action would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Appropriate steps to minimize potential adverse impacts of the discharge in aquatic systems include use of suitable erosion control technologies with the implementation of procedures to protect against erosion and sedimentation during and after construction.

Additionally, construction associated with PFM 8 would result in permanent fill of jurisdictional waters of the U.S. associated with Lewisville Lake, however, this proposed fill material would return the dam cross section to the original design specifications. There would also be temporary impacts associated with in-water construction. If Lewisville Lake water levels are inundating the construction area upstream of the dam, a cofferdam would be used to minimize potential impacts that would have occurred if lake lowering were required. Direct impacts would not be considered significant, as this proposed fill material is considered maintenance of an existing serviceable structure to original design specifications and any impacts would be minimized and avoided, as appropriate.

Finally, installation of the downstream grade control/barrier wall would also result in permanent fill of jurisdictional waters of the U.S. (as designated by the USFWS National Wetlands Inventory) associated with the spillway channel; however, this proposed fill is minimal in nature and will provide long term stability of the area, thereby decreasing erosion potential and downstream sedimentation in the long term.

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Appendix E

Air Quality Analysis

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Lewisville Dam Modification Project

Equipment	Eq-Hrs	HP	VOC Tons	CO Tons	NOx Tons	SOx Tons	PM10 Tons	PM2.5 Tons	CO2 Metric Tons
Diesel powered									
Vibroplate Compactor, 21" wide	392	5.5	0.001	0.016	0.010	0.000	0.002	0.002	1.269
Centrifugal Pump, Engine Drive, 150 GPM	115,200	6.5	0.496	3.555	3.564	0.045	0.416	0.403	440.753
Concrete Vibrator w/7.5 HP Generator	31	7.5	0.000	0.001	0.001	0.000	0.000	0.000	0.137
Concrete Saw, Self-Propelled 7"	201	13	0.001	0.010	0.012	0.000	0.001	0.001	1.539
Gernerator, 10 KW	204	13.4	0.001	0.007	0.013	0.000	0.001	0.001	1.610
Centrifugal Pump, Engine Drive, 750 GPM	672	16	0.006	0.027	0.053	0.001	0.002	0.002	6.333
Vibratory Roller, Walk-Behind, 33" wide	74	18.5	0.001	0.006	0.006	0.000	0.001	0.001	0.806
Grout Mixer, 20 GPM	200	23	0.002	0.011	0.023	0.000	0.001	0.001	2.709
Skid-Steer, 60" Bucket, 13 CWT, Bobcat	281	46	0.010	0.060	0.075	0.001	0.013	0.013	7.620
Welder, Engine Driven, DSL 400 AMP	32	48	0.001	0.007	0.009	0.000	0.001	0.001	0.905
Agricultural Tractor, 55 HP	851	55	0.022	0.202	0.232	0.003	0.012	0.012	27.577
Hyd Crane, Self-Propelled 10.5 ton	60	62	0.002	0.011	0.019	0.000	0.001	0.001	2.192
Centrifugal Pump, Engine Drive,	15	68	0.000	0.003	0.005	0.000	0.000	0.000	0.601
Fork Lift,30' Mast	408	75	0.015	0.148	0.153	0.002	0.011	0.011	18.029
Hydraulic Auger, 3500 ft-lb w/trailer	196	80	0.007	0.043	0.082	0.001	0.003	0.003	9.239
Truck Mtd Concrete Grinder	250	86	0.010	0.061	0.112	0.001	0.005	0.005	12.668
FE Loader, Wheel, 1.25 CY Bucket	66	89	0.003	0.025	0.029	0.000	0.002	0.002	3.461
FE Loader, Crawler, 1.5 CY Bucket	98	90	0.004	0.039	0.044	0.001	0.003	0.003	5.197
Loader/Backhoe, Wheel, 1.4 CY Bucket	106	91	0.010	0.068	0.055	0.001	0.005	0.005	5.683
Loader/Backhoe, Wheel, 1.1 CY Bucket	1,129	92	0.105	0.732	0.595	0.006	0.057	0.055	61.199
Trk Mounted Drill Rig, 25,000 GVW	502	100	0.022	0.137	0.261	0.003	0.010	0.009	29.578
Hyd Excavator, 36,000 LB	288	101	0.013	0.048	0.126	0.002	0.006	0.006	15.416
Truck Mtd Rotary Drill Rig, 21,000 GVW	472	105	0.020	0.049	0.225	0.003	0.006	0.006	26.265
Hyd Crane, Self-Propelled 15 ton	930	110	0.042	0.107	0.466	0.005	0.015	0.014	54.215
Vibratory Roller, Self-Propelled, 10.4 ton	4	131	0.000	0.001	0.002	0.000	0.000	0.000	0.278

Equipment	Eq-Hrs	HP	VOC Tons	CO Tons	NOx Tons	SOx Tons	PM10 Tons	PM2.5 Tons	CO2 Metric Tons
Motor Grader 138 HP 12' Blade Width	644	138	0.039	0.146	0.386	0.005	0.017	0.017	47.099
Vibratory Roller, Self-Propelled, 13 ton	157	145	0.010	0.036	0.099	0.001	0.004	0.004	12.065
Hyd Excavator, Crawler, 55,000 LB 1.5 CY Bucket	104	167	0.008	0.029	0.075	0.001	0.003	0.003	9.204
FE Loader, wheel, 3.5 CY Bucket	2,254	180	0.162	0.572	1.717	0.022	0.046	0.045	215.056
FE Loader, Wheel, 3 CY Bucket	293	181	0.021	0.075	0.224	0.003	0.006	0.006	28.111
Vibratory Roller, Self-Propelled, 22 ton	5	195	0.000	0.001	0.004	0.000	0.000	0.000	0.517
Dozer, 181-250 HP	513	200	0.041	0.144	0.434	0.006	0.011	0.011	54.384
Vibratory Roller, Self-Propelled, 12 ton	52	205	0.004	0.015	0.045	0.001	0.001	0.001	5.650
Asphalt Paver, 10 ft wide	75	224	0.007	0.023	0.071	0.001	0.002	0.002	8.905
Dump Trk, Highway, 35,000 GVW	214	230	0.042	0.107	0.239	0.003	0.010	0.010	26.090
Dozer, 240 HP	458	240	0.044	0.154	0.465	0.006	0.012	0.012	58.264
Truck Mtd Crane, 17 ton	1,540	245	0.142	0.340	1.677	0.020	0.028	0.027	199.991
Hyd Excavator, Crawler, 80,900 LB 2.09 CY Bucket	131	270	0.014	0.050	0.150	0.002	0.004	0.004	18.748
Truck, Off-Highway, Articulating 35 ton	1,334	355	0.103	0.765	1.255	0.025	0.069	0.067	251.234
Agricultural Tractor, 360 HP	161	360	0.012	0.087	0.152	0.003	0.007	0.007	30.748
Dump Truck, 75,000 GVW	197	370	0.033	0.177	0.221	0.004	0.017	0.017	38.669
Hyd Excavator, Crawler, 140,0000 LB 3.5 CY Bucket	180	433	0.017	0.120	0.206	0.004	0.010	0.010	41.348
Static Roller, self-propelled, 40 ton	563	442	0.053	0.376	0.655	0.013	0.032	0.031	132.015
Air Compressor, 350 PSI	120	475	0.012	0.057	0.158	0.003	0.005	0.005	30.239
Asphalt Miller, self-propelled, 6.5' wide	48	575	0.006	0.041	0.073	0.001	0.003	0.003	14.642
Truck Mtd Rotary Drill Rig	46	600	0.006	0.026	0.076	0.001	0.002	0.002	14.642
Dump Truck, 75,000 GVW - material delivery	4,064	370	0.684	3.651	4.565	0.081	0.357	0.346	797.742
Concrete Truck, 75,000 GVW - material delivery	404	370	0.068	0.363	0.454	0.008	0.035	0.034	79.270
			2.321	**12.726**	**19.576**	**0.289**	**1.254**	**1.216**	**2,850**

Equipment	Eq-Hrs	HP	VOC Tons	CO Tons	NOx Tons	SOx Tons	PM10 Tons	PM2.5 Tons	CO2 Metric Tons
Truck, Highway, 3/4 - 1 ton Pickup	3,621		0.06	0.58	0.06	0.001	0.01	0.00	81.4
Trk, Highway 20,000 - 55,000 lb GVW	4,012		0.03	0.16	0.72	0.000	0.03	0.03	62.6
Delivery Truck (assume 40 mi one way)	4,444		0.15	0.80	3.61	0.002	0.15	0.15	311.9
		Subtotal	0.24	1.54	4.39	0.003	0.19	0.18	455.88
		Grand Totals	**2.56**	**14.27**	**23.96**	**0.29**	**1.44**	**1.40**	**3,306**

Tons per Year						
VOC	**CO**	**NOx**	**SO2**	**PM10**	**PM2.5**	**CO2**
0.9	4.8	8.0	0.1	0.5	0.5	1,102

	Eq-Hrs	HP	VOC Tons	CO Tons	NOx Tons	SOx Tons	PM10 Tons	PM2.5 Tons	CO2 Metric Tons
Phase 2 Construction									
Compactor, Vibroplate, 21" wide	2,045	5.5	0.008	0.081	0.051	0.001	0.008	0.008	6.620
Pump, Centrifugal, Dewatering, Engine Drive	14,400	6.5	0.062	0.444	0.446	0.006	0.052	0.050	55.094
7.5 HP (5.6 KW) GENERATOR	8	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.035
Agricultural Tractor, 55 HP	81	55	0.002	0.019	0.022	0.000	0.001	0.001	2.625
Static Roller, Pneumatic, 9 tires	56	70	0.002	0.017	0.020	0.000	0.001	0.001	2.310
FE Loader, Crawler, 1.5 CY Bucket	442	90	0.019	0.177	0.198	0.002	0.012	0.011	23.438
Loader/Backhoe, Wheel, 1.4 CY Bucket	1,547	91	0.143	0.992	0.806	0.008	0.079	0.077	82.946
Loader/Backhoe, wheel, 1 CY FE Bucket	111	92	0.010	0.072	0.058	0.001	0.006	0.006	6.017
DRILL, EARTH/AUGER, MULTI-PURPOSE, 8" (203 M	39	105	0.002	0.004	0.019	0.000	0.001	0.000	2.170
Crane, Lattice Boom, Crawler, 17 ton	25	110	0.001	0.003	0.013	0.000	0.000	0.000	1.457
Motor Grader 138 HP 12' Blade Width	135	138	0.008	0.031	0.081	0.001	0.004	0.004	9.873
Dozer, 145 HP	25	145	0.002	0.006	0.016	0.000	0.001	0.001	1.921
Vibratory Roller, Single Drum, 11.5 ton	259	160	0.018	0.066	0.189	0.002	0.008	0.007	21.962
Hyd Excavator, Crawler, 55,000 LB 1.5 CY Bucket	8	167	0.001	0.002	0.006	0.000	0.000	0.000	0.708
FE Loader, Wheel, 3 CY Bucket	24	170	0.004	0.011	0.018	0.000	0.002	0.002	2.162
Front End Loader, Crawler, 2.6 CY Bucket	142	189	0.011	0.064	0.114	0.001	0.003	0.003	14.226
Vibratory Roller, Self-Propelled, 22 ton	8	201	0.001	0.002	0.007	0.000	0.000	0.000	0.852
CONCRETE PUMP, PUMP & BOOM, 117 CY/HR (89	8	210	0.001	0.002	0.007	0.000	0.000	0.000	0.890
Man-Lift Line Truck, Aerial Platform	4	210	0.001	0.002	0.004	0.000	0.000	0.000	0.445
ASPHALT PAVER, 10.0' (3.1 M) WIDE, SELF PROPEL	63	224	0.006	0.020	0.060	0.001	0.001	0.001	7.480
Dozer, 181-250 HP	10	240	0.001	0.003	0.010	0.000	0.000	0.000	-0.002
Hyd Excavator, Crawler, 70K, 2 CY Bucket	154	270	0.017	0.059	0.176	0.002	0.005	0.005	22.040
Dozer, 300-340 HP	15	317	0.001	0.007	0.022	0.000	0.000	0.000	2.523
CRANE, HYDRAULIC, TRUCK MOUNTED, 60 TON (5	8	349	0.001	0.003	0.013	0.000	0.000	0.000	1.481
Truck, Off-Highway, Articulating 35 ton	112	355	0.019	0.064	0.212	0.002	0.009	0.008	21.093
Hyd Excavator, Crawler, 140,0000 LB 3.5 CY	183	433	0.017	0.127	0.364	0.004	0.009	0.009	42.037
Static Roller, Self-Propelled, Sheepsfoot, 40 ton	117	442	0.011	0.080	0.237	0.003	0.005	0.005	27.435
ASPHALT MILLER, 6.5' (2 M) WIDE, SELF PROPELLE	8	575	0.001	0.007	0.021	0.000	0.000	0.000	2.440
Dump Truck, 75,000 GVW - material delivery	251	370	0.042	0.226	0.282	0.005	0.022	0.021	49.353
			0.408	**2.593**	**3.469**	**0.042**	**0.231**	**0.224**	**411.632**

	Eq-Hrs	HP	VOC Tons	CO Tons	NOx Tons	SOx Tons	PM10 Tons	PM2.5 Tons	CO2 Metric Tons
Truck, Highway, 8,600 Lb GVW	896		0.015	0.143	0.014	0.000	0.002	0.001	20.134
Truck, Highway, 20,000 - 55,000 lbs GVW	1,562		0.012	0.063	0.282	0.000	0.012	0.011	24.362
Delivery Truck (assume 40 mi one way)	4,444		0.15	0.80	3.61	0.002	0.15	0.15	311.9
			0.43	**2.80**	**3.77**	**0.04**	**0.24**	**0.24**	**456**

Tons per Year						
VOC	CO	NOx	SO2	PM10	PM2.5	CO2
0.1	0.7	0.9	0.0	0.1	0.1	114.0

PHASE 1 CONSTRUCTION

Equipment	HP	Load Factor	Activity Hr/yr	Median Life (hr)	HC (g/hp-hr)	HC_{DF}	HC_{TAF}	CO (g/hp-hr)	CO_{DF}	CO_{TAF}	NOx (g/hp-hr)	NOx_{DF}	NOx_{TAF}	$S_{PM\ Adj}$	PM10 (g/hp-hr)	PM_{DF}	PM_{TAF}	$BSFC_{TAF}$
Vibroplate Compactor, 21" wide	5.5	0.43	484	2500	0.5508	1.01	1.05	4.1127	1.04	1.53	4.3	1.00	0.95	0.093	0.5	1.23	1.23	1.01
Centrifugal Pump, Engine Drive,	6.5	0.58	403	2500	0.5508	1.02	1	4.1127	1.05	1	4.3	1.00	1	0.092	0.5	1.19	1	1
Concrete Vibrator w/7.5 HP	7.5	0.43	606	2500	0.5508	1.02	1	4.1127	1.05	1	4.3	1.00	1	0.092	0.5	1.29	1	1
Concrete Saw, Self-Propelled 7"	13	0.58	580	2500	0.438	1.02	1.05	2.161	1.07	1.53	4.4399	1.01	0.95	0.093	0.2665	1.15	1.23	1.01
Gernerator, 10 KW	13.4	0.43	338	2500	0.438	1.01	1	2.161	1.03	1	4.4399	1.00	1	0.092	0.2665	1.09	1	1
Centrifugal Pump, Engine Drive,	16	0.58	403	2500	0.438	1.02	1	2.161	1.05	1	4.4399	1.00	1	0.092	0.2665	1.10	1	1
Vibratory Roller, Walk-Behind,	18.5	0.58	760	2500	0.438	1.06	1.05	2.161	1.18	1.53	4.4399	1.02	0.95	0.093	0.2665	1.38	1.23	1.01
Grout Mixer, 20 GPM	23	0.43	275	2500	0.438	1.02	1	2.161	1.05	1	4.4399	1.00	1	0.092	0.2665	1.14	1	1
Skid-Steer, 60" Bucket, 13 CWT,	46	0.23	818	2500	0.2789	1.03	2.29	1.5323	1.08	2.57	4.7279	1.01	1.1	0.108	0.3389	1.52	1.97	1.18
Welder, Engine Driven, DSL 400	48	0.19	643	2500	0.2789	1.02	2.29	1.5323	1.05	2.57	4.7279	1.00	1.1	0.092	0.3389	1.41	1	1
Agricultural Tractor, 55 HP	55	0.78	475	4667	0.3672	1.03	1.05	2.3655	1.08	1.53	4.7	1.01	0.95	0.093	0.24	1.12	1.23	1.01
Hyd Crane, Self-Propelled 10.5	62	0.43	990	4667	0.3672	1.03	1	2.3655	1.09	1	4.7	1.01	1	0.092	0.24	1.24	1	1
Centrifugal Pump, Engine Drive,	68	0.58	403	4667	0.3672	1.02	1	2.3655	1.05	1	4.7	1.00	1	0.092	0.24	1.10	1	1
Fork Lift,30' Mast	75	0.58	1700	4667	0.3672	1.07	1.05	2.3655	1.21	1.53	4.7	1.02	0.95	0.093	0.24	1.41	1.23	1.01
Hydraulic Auger, 3500 ft-lb	80	0.43	466	4667	0.3672	1.01	1	2.3655	1.04	1	4.7	1.00	1	0.092	0.24	1.11	1	1
Truck Mtd Concrete Grinder	86	0.43	955	4667	0.3672	1.03	1	2.3655	1.09	1	4.7	1.01	1	0.092	0.24	1.23	1	1
FE Loader, Wheel, 1.25 CY Bucket	89	0.48	761	4667	0.3672	1.03	1.05	2.3655	1.08	1.53	4.7	1.01	0.95	0.093	0.24	1.19	1.23	1.01
FE Loader, Crawler, 1.5 CY Bucket	90	0.58	936	4667	0.3672	1.04	1.05	2.3655	1.12	1.53	4.7	1.01	0.95	0.093	0.24	1.23	1.23	1.01
Loader/Backhoe, Wheel, 1.4 CY	91	0.21	1135	4667	0.3672	1.02	2.29	2.3655	1.05	2.57	4.7	1.00	1.1	0.108	0.24	1.28	1.97	1.18
Loader/Backhoe, Wheel, 1.1 CY	92	0.21	1135	4667	0.3672	1.02	2.29	2.3655	1.05	2.57	4.7	1.00	1.1	0.108	0.24	1.28	1.97	1.18
Trk Mounted Drill Rig, 25,000	100	0.43	466	4667	0.3672	1.01	1	2.3655	1.04	1	4.7	1.00	1	0.092	0.24	1.11	1	1
Hyd Excavator, 36,000 LB	101	0.53	1092	4667	0.3384	1.04	1.05	0.8667	1.13	1.53	4.1	1.01	0.95	0.083	0.18	1.20	1.23	1.01
Truck Mtd Rotary Drill Rig, 21,000	105	0.43	466	4667	0.3384	1.01	1	0.8667	1.04	1	4.1	1.00	1	0.082	0.18	1.09	1	1
Hyd Crane, Self-Propelled 15 ton	110	0.43	990	4667	0.3384	1.03	1	0.8667	1.09	1	4.1	1.01	1	0.082	0.18	1.18	1	1
Vibratory Roller, Self-Propelled,	131	0.58	760	4667	0.3384	1.03	1.05	0.8667	1.10	1.53	4.1	1.01	0.95	0.083	0.18	1.14	1.23	1.01
Motor Grader 138 HP 12' Blade	138	0.58	962	4667	0.3384	1.04	1.05	0.8667	1.12	1.53	4.1	1.01	0.95	0.083	0.18	1.18	1.23	1.01
Vibratory Roller, Self-Propelled,	145	0.58	760	4667	0.3384	1.03	1.05	0.8667	1.10	1.53	4.1	1.01	0.95	0.083	0.18	1.14	1.23	1.01
Hyd Excavator, Crawler, 55,000	167	0.53	1092	4667	0.3384	1.04	1.05	0.8667	1.13	1.53	4.1	1.01	0.95	0.083	0.18	1.20	1.23	1.01
FE Loader, wheel, 3.5 CY Bucket	180	0.48	1135	4667	0.3085	1.04	1.05	0.7475	1.12	1.53	4.0	1.01	0.95	0.083	0.1316	1.15	1.23	1.01
FE Loader, Wheel, 3 CY Bucket	181	0.48	1135	4667	0.3085	1.04	1.05	0.7475	1.12	1.53	4.0	1.01	0.95	0.083	0.1316	1.15	1.23	1.01
Vibratory Roller, Self-Propelled,	195	0.58	760	4667	0.3085	1.03	1.05	0.7475	1.10	1.53	4.0	1.01	0.95	0.083	0.1316	1.10	1.23	1.01
Dozer, 181-250 HP	200	0.58	899	4667	0.3085	1.04	1.05	0.7475	1.11	1.53	4.0	1.01	0.95	0.083	0.1316	1.12	1.23	1.01
Vibratory Roller, Self-Propelled,	205	0.58	760	4667	0.3085	1.03	1.05	0.7475	1.10	1.53	4.0	1.01	0.95	0.083	0.1316	1.10	1.23	1.01
Asphalt Paver, 10 ft wide	224	0.58	821	4667	0.3085	1.03	1.05	0.7475	1.10	1.53	4.0	1.01	0.95	0.083	0.1316	1.11	1.23	1.01
Dump Trk, Highway, 35,000 GVW	230	0.21	566	4667	0.3085	1.01	2.29	0.7475	1.03	2.57	4.0	1.00	1.1	0.097	0.1316	1.08	1.97	1.18
Dozer, 240 HP	240	0.58	899	4667	0.3085	1.04	1.05	0.7475	1.11	1.53	4.0	1.01	0.95	0.083	0.1316	1.12	1.23	1.01
Truck Mtd Crane, 17 ton	245	0.43	990	4667	0.3085	1.03	1	0.7475	1.09	1	4.0	1.01	1	0.082	0.1316	1.13	1	1
Hyd Excavator, Crawler, 80,900	270	0.53	1092	4667	0.3085	1.04	1.05	0.7475	1.13	1.53	4.0	1.01	0.95	0.083	0.1316	1.15	1.23	1.01
Truck, Off-Highway, Articulating	355	0.58	1641	7000	0.1669	1.05	1.05	0.8425	1.14	1.53	2.5	1.01	0.95	0.083	0.15	1.17	1.23	1.01
Agricultural Tractor, 360 HP	360	0.78	475	7000	0.1669	1.02	1.05	0.8425	1.05	1.53	2.5	1.00	0.95	0.083	0.15	1.05	1.23	1.01
Dump Truck, 75,000 GVW	370	0.21	566	7000	0.1669	1.01	2.29	0.8425	1.02	2.57	2.5	1.00	1.1	0.097	0.15	1.06	1.97	1.18
Hyd Excavator, Crawler, 140,0000	433	0.53	1092	7000	0.1669	1.03	1.05	0.8425	1.08	1.53	2.5	1.01	0.95	0.083	0.15	1.11	1.23	1.01
Static Roller, self-propelled, 40	442	0.58	760	7000	0.1669	1.02	1.05	0.8425	1.06	1.53	2.5	1.01	0.95	0.083	0.15	1.08	1.23	1.01
Air Compressor, 350 PSI	475	0.58	815	7000	0.1669	1.02	1	0.8425	1.07	1	2.5	1.01	1	0.082	0.15	1.08	1	1
Asphalt Miller, self-propelled,	575	0.58	561	7000	0.1669	1.02	1.05	0.8425	1.05	1.53	2.5	1.00	0.95	0.083	0.15	1.06	1.23	1.01
Truck Mtd Rotary Drill Rig	600	0.43	466	7000	0.1669	1.01	1	0.8425	1.03	1	2.5	1.00	1	0.082	0.15	1.05	1	1

	HC	CO	NOx	PM
Deterioration Factor	0.034	0.101	0.009	0.473

Fuel sulfur content 0.015 %

EF_{adj} = EF_{ss}*TAF*DF

All diesel equipment assumed to be Tier 2

Age for all large equipment is assumed to be 10 yr

Age for all small equipment is assumed to be 5 yr

lb to g conversion = 453.6 g/lb

HC to VOC conversion = 1.053

Phase 1

PFM 6

746,624	SF geomembrane
0.5	ft gravel
13,826	CY gravel

PFM 7

23	slabs
89	CY concrete per slab
2,044	Total CY

PFM 4A trench drain

380	LF collection trench
1,865	CY sand
296	CY gravel
380	LF of 2' drain tile

PFM 4B

1210	LF trench drain
5,939	CY sand
942	CY gravel
1210	LF of 2' drain tile

Inverted filter berm

3	ft of sand
7	ft topsoil
155	ft wide on average
400	ft long
6,889	CY sand
16,074	CY topsoil

Phase 2

PFM 2

200	CY sand
1780	CY sand

Phase 1 trips

Total dump truck trips	2,286	FY18 - FY20	3	Years			
Delivery trucks					3750	1250	per year
Total cement truck trips	227						

Phase 2 trips

Total dump truck trips	141	FY23-25	18	months			
Delivery trucks		FY22-FY25	4	years	3,000	750	per year

PHASE 2 CONSTRUCTION

	HP	Load Factor	Activity Hr/yr	Median Life (hr)	HC (g/hp-hr)	HC_{DF}	HC_{TAF}	CO (g/hp-hr)	CO_{DF}	CO_{TAF}	NOx (g/hp-hr)	NOx_{DF}	NOx_{TAF}	$S_{PM\ Adj}$	PM10 (g/hp-hr)	PM_{DF}	PM_{TAF}	$BSFC_{TAF}$
Compactor, Vibroplate, 21" wide	5.5	0.43	484	2500	0.5508	1.01	1.05	4.1127	1.04	1.53	4.3	1.00	0.95	0.093	0.5	1.23	1.23	1.01
Pump, Centrifugal, Dewatering, Engine Drive	6.5	0.58	403	2500	0.5508	1.02	1	4.1127	1.05	1	4.3	1.00	1	0.092	0.5	1.19	1	1
7.5 HP (5.6 KW) GENERATOR	13.4	0.43	338	2500	0.438	1.01	1	2.161	1.03	1	4.4399	1.00	1	0.092	0.2665	1.09	1	1
Agricultural Tractor, 55 HP	55	0.78	475	4667	0.3672	1.03	1.05	2.3655	1.08	1.53	4.7	1.01	0.95	0.092	0.24	1.12	1.23	1
Static Roller, Pneumatic, 9 tires	70	0.58	760	4667	0.3672	1.03	1.03	2.3655	1.10	1.53	4.7	1.01	1	0.093	0.24	1.18	1.23	1.01
FE Loader, Crawler, 1.5 CY Bucket	90	0.58	936	4667	0.3672	1.04	1.05	2.3655	1.12	1.53	4.7	1.01	0.95	0.093	0.24	1.23	1.23	1.01
Loader/Backhoe, Wheel, 1.4 CY Bucket	91	0.21	1135	4667	0.3672	1.02	2.29	2.3655	1.05	2.57	4.7	1.00	1.1	0.093	0.24	1.28	1.97	1.01
Loader/Backhoe, wheel, 1 CY FE Bucket	92	0.21	1135	4667	0.3672	1.02	2.29	2.3655	1.05	2.57	4.7	1.00	1.1	0.093	0.24	1.28	1.97	1.01
DRILL, EARTH/AUGER, MULTI-PURPOSE, 8" (2	105	0.43	466	4667	0.3384	1.01	1	0.8667	1.04	1	4.1	1.00	1	0.082	0.18	1.09	1	1
Crane, Lattice Boom, Crawler, 17 ton	110	0.43	990	4667	0.3384	1.03	1	0.8667	1.09	1	4.1	1.01	1	0.083	0.18	1.18	1	1.01
Motor Grader 138 HP 12' Blade Width	138	0.58	962	4667	0.3384	1.04	1.05	0.8667	1.12	1.53	4.1	1.01	0.95	0.083	0.18	1.18	1.23	1.01
Dozer, 145 HP	145	0.58	899	4667	0.3384	1.04	1.05	0.8667	1.11	1.53	4.1	1.01	0.95	0.083	0.18	1.16	1.23	1.01
Vibratory Roller, Single Drum, 11.5 ton	160	0.58	760	4667	0.3384	1.03	1.03	0.8667	1.10	1.53	4.1	1.01	1	0.083	0.18	1.14	1.23	1.01
Hyd Excavator, Crawler, 55,000 LB 1.5 CY Buc	167	0.53	1092	4667	0.3384	1.04	1.05	0.8667	1.13	1.53	4.1	1.01	0.95	0.083	0.18	1.20	1.23	1.01
FE Loader, Wheel, 3 CY Bucket	170	0.48	1135	4667	0.3384	1.04	2.29	0.8667	1.12	2.57	4.1	1.01	0.95	0.083	0.18	1.21	1.97	1.01
Front End Loader, Crawler, 2.6 CY Bucket	189	0.48	1135	4667	0.3085	1.04	1.05	0.7475	1.12	2.57	4	1.01	0.95	0.083	0.1316	1.15	1.23	1.01
Vibratory Roller, Self-Propelled, 22 ton	201	0.58	760	4667	0.3085	1.03	1.03	0.7475	1.10	1.53	4	1.01	0.95	0.083	0.1316	1.10	1.23	1.01
CONCRETE PUMP, PUMP & BOOM, 117 CY/HI	210	0.58	606	4667	0.3085	1.03	1.05	0.7475	1.08	1.53	4	1.01	0.95	0.083	0.1316	1.08	1.23	1.01
Man-Lift Line Truck, Aerial Platform	210	0.21	384	4667	0.3085	1.01	2.29	0.7475	1.02	2.57	4	1.00	0.95	0.097	0.1316	1.05	1.97	1.18
ASPHALT PAVER, 10.0' (3.1 M) WIDE, SELF PR	224	0.58	821	4667	0.3085	1.03	1.05	0.7475	1.10	1.53	4	1.01	0.95	0.083	0.1316	1.11	1.23	1.01
Dozer, 181-250 HP	240	0.58	760	4667	0.3085	1.03	1.05	0.7475	1.10	1.53	4	1.01	0.95	0.000	0.1316	1.10	1.23	1.01
Hyd Excavator, Crawler, 70K, 2 CY Bucket	270	0.53	1092	4667	0.3085	1.04	1.05	0.7475	1.13	1.53	4	1.01	0.95	0.083	0.1316	1.15	1.23	1.01
Dozer, 300-340 HP	317	0.58	760	4667	0.1669	1.03	1.05	0.8425	1.10	1.53	4.3351	1.01	0.95	0.083	0.1316	1.10	1.23	1.01
CRANE, HYDRAULIC, TRUCK MOUNTED, 60 TO	349	0.43	990	4667	0.1669	1.03	1	0.8425	1.09	1	4.3351	1.01	1	0.083	0.1316	1.13	1	1.01
Truck, Off-Highway, Articulating 35 ton	355	0.58	1641	7000	0.1669	1.05	2.29	0.8425	1.14	1.53	4.3351	1.01	1.1	0.097	0.1316	1.15	1.97	1.18
Hyd Excavator, Crawler, 140,0000 LB 3.5 CY B	433	0.53	1092	4667	0.1669	1.04	1.05	0.8425	1.13	1.53	4.3351	1.01	0.95	0.083	0.1316	1.15	1.23	1.01
Static Roller, Self-Propelled, Sheepsfoot, 40 to	442	0.58	760	4667	0.1669	1.03	1.03	0.8425	1.10	1.53	4.3351	1.01	0.95	0.083	0.1316	1.10	1.23	1.01
ASPHALT MILLER, 6.5' (2 M) WIDE, SELF PROF	575	0.58	622	7000	0.1669	1.02	1.05	0.8425	1.05	1.53	4.3351	1.00	0.95	0.083	0.1316	1.06	1.23	1.01

Calculations made using EPA's Nonroad 2010 documentation:
Conversion Factors for Hydrocarbon Emissions, 2010
Exhaust and Crankcase Emission Factors for NonRoad Compression Ignition Engines, 2010
Median Life, Activity and Load for NonRoad Engines, 2010

Moves 2010, USEPA
and
Personal communications with Arvil Bass, Geotechnical Branch Chief, SWD Dam Safety Production Center, USACE regarding type of equipment to be used and duration of operations.

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