

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

**National Inventory of Dams NIDID: TX00008**



**February 2017**



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**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 the 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. 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. After the modifications to the embankment are complete, the USACE would also establish a 50-foot wide “vegetation clear zone” adjacent to the embankment where vegetation would be regularly mowed.

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 locations 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 the existing surrounding topography, as possible. After the borrow areas have been graded, the 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. No compensatory mitigation is proposed or required for this action.

The proposed dam safety modifications would reduce the risk of dam failure to within the 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.

Anticipated Environmental Effects. Through the planning process, the USACE developed and analyzed eight options for implementing the Proposed Action. However, because the potential impacts associated with the each option were virtually identical, the USACE is moving forward with only one action alternative. The 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, there would be increased adverse consequences in the event of dam failure as a result of the increasing population within the Study Area.

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 would occur. The Proposed Action would impact 10.5 acres of 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

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## Acronyms and Abbreviations

|         |   |                   |   |
|---------|---|-------------------|---|
| %       | percent   | LLELA             | Lewisville Lake Environmental Learning Area   |
| ACE     | Annual Chance Exceedance                              | MBTA              | Migratory Bird Treaty Act   |
| AEP     | annual exceedance probability                         | msl               | mean sea level  |
| APE     | Area of Potential Effect                              |                   |   |
| AQCR    | Air Quality Control Region                            | N/A               | not applicable  |
| BCC     | Birds of Conservation Concern                         | NAAQS             | National Ambient Air Quality Standards  |
| BCRA    | Base Condition Risk Assessment                        | NCTCOG            | North Central Texas Council of Governments  |
| BMP     | best management practice                              | NEPA              | National Environmental Policy Act   |
| CAA     | Clean Air Act   | NHPA              | National Historic Preservation Act  |
| CAP     | Contingency Action Plan                               | NO <sub>2</sub>   | nitrogen dioxide  |
| CDC     | Corridor Development Certificate                      | NO <sub>x</sub>   | oxides of nitrogen  |
| CEQ     | Council on Environmental Quality                      | NOA               | Notice of Availability  |
| CFR     | Code of Federal Regulations                           | NOI               | Notice of Intent  |
| cfs     | cubic feet per second                                 | NRHP              | National Register of Historic Places  |
| CO      | carbon monoxide                                       | O <sub>3</sub>    | ozone   |
| CWA     | Clean Water Act                                       | O&M               | operation and maintenance   |
| dbh     | diameter at breast height                             | PAL               | Planning Aid Letter   |
| DCTA    | Denton County Transit Authority                       | PAR               | Planning Aid Report   |
| DFW     | Dallas-Fort Worth International Airport               | Pb                | lead  |
| DGNO    | Dallas, Garland & Northeastern Railroad               | PD                | Planned Development   |
| DSAC    | Dam Safety Action Classification                      | PFM               | potential failure modes   |
| DSMS    | Dam Safety Modification Study                         | PM <sub>2.5</sub> | particulate matter less than 2.5 microns in diameter                                  |
| EA      | Environmental Assessment                              | PM <sub>10</sub>  | particulate matter less than 10 microns in diameter                                   |
| EDR     | Environmental Data Resources, Inc.                    | ppb               | parts per billion   |
| EIS     | Environmental Impact Statement                        | ppm               | parts per million   |
| EO      | Executive Order                                       |                   |   |
| EPP     | Environmental Protection Plan                         | ROD               | Record of Decision  |
| ER      | Engineering Regulation                                | ROI               | region of influence   |
| ESA     | Endangered Species Act                                |                   |   |
| °F      | degrees Fahrenheit                                    | SAFETEA-LU        | Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users |
| FEMA    | Federal Emergency Management Agency                   |                   |   |
| FWPC    | Future without Project Condition                      | SCM               | special conservation measure  |
| FY      | fiscal year   | SH                | State Highway   |
| GCR     | General Conformity Rule                               | SIP               | State Implementation Plan   |
| GHG     | greenhouse gases                                      | SO <sub>2</sub>   | sulfur dioxide  |
| gpm     | gallons per minute                                    | SPF               | Standard Project Flood  |
| H&H     | hydrology and hydraulic                               | spp.              | species   |
| HEC-RAS | Hydrologic Engineering Center - River Analysis System | SPRA              | Screening Portfolio Risk Analysis   |
| HEP     | Habitat Evaluation Procedures                         | SWPPP             | Stormwater Pollution Prevention Plan  |
| HSI     | habitat suitability index                             | TAC               | Texas Agricultural Code   |
| HU      | habitat unit  | TCEQ              | Texas Commission on Environmental Quality   |
| IBI     | Index of Biotic Integrity                             | THC               | Texas Historical Commission   |
| IH      | Interstate Highway                                    | TIP               | Transportation Improvement Program  |
| IPaC    | Information for Planning and Conservation             | TIPPC             | Texas Invasive Plant and Pest Council   |
| LAERF   | Lewisville Aquatic Ecosystem Research Facility        | TMDL              | total maximum daily load  |
|         |   | TPDES             | Texas Pollutant Discharge Elimination System  |
|         |   | TPWD              | Texas Parks and Wildlife Department   |

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



**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.

**Prepared By:** United States Army Corps of Engineers  
Fort Worth District  
**Point of Contact:** Marcia Hackett  
819 Taylor Street, Room 3A12  
Fort Worth, Texas 76102-0300  
E-mail: [marcia.r.hackett@usace.army.mil](mailto:marcia.r.hackett@usace.army.mil)  
Tel: (817) 886-1373  
Fax: (817) 886-6562

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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. No compensatory mitigation is proposed or required for this action.

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**PROPOSED LEWISVILLE DAM SAFETY MODIFICATIONS  
ENVIRONMENTAL ASSESSMENT  
FEBRUARY 2017**

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# CHAPTER 1

## PURPOSE AND NEED FOR PROPOSED ACTION

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### 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.

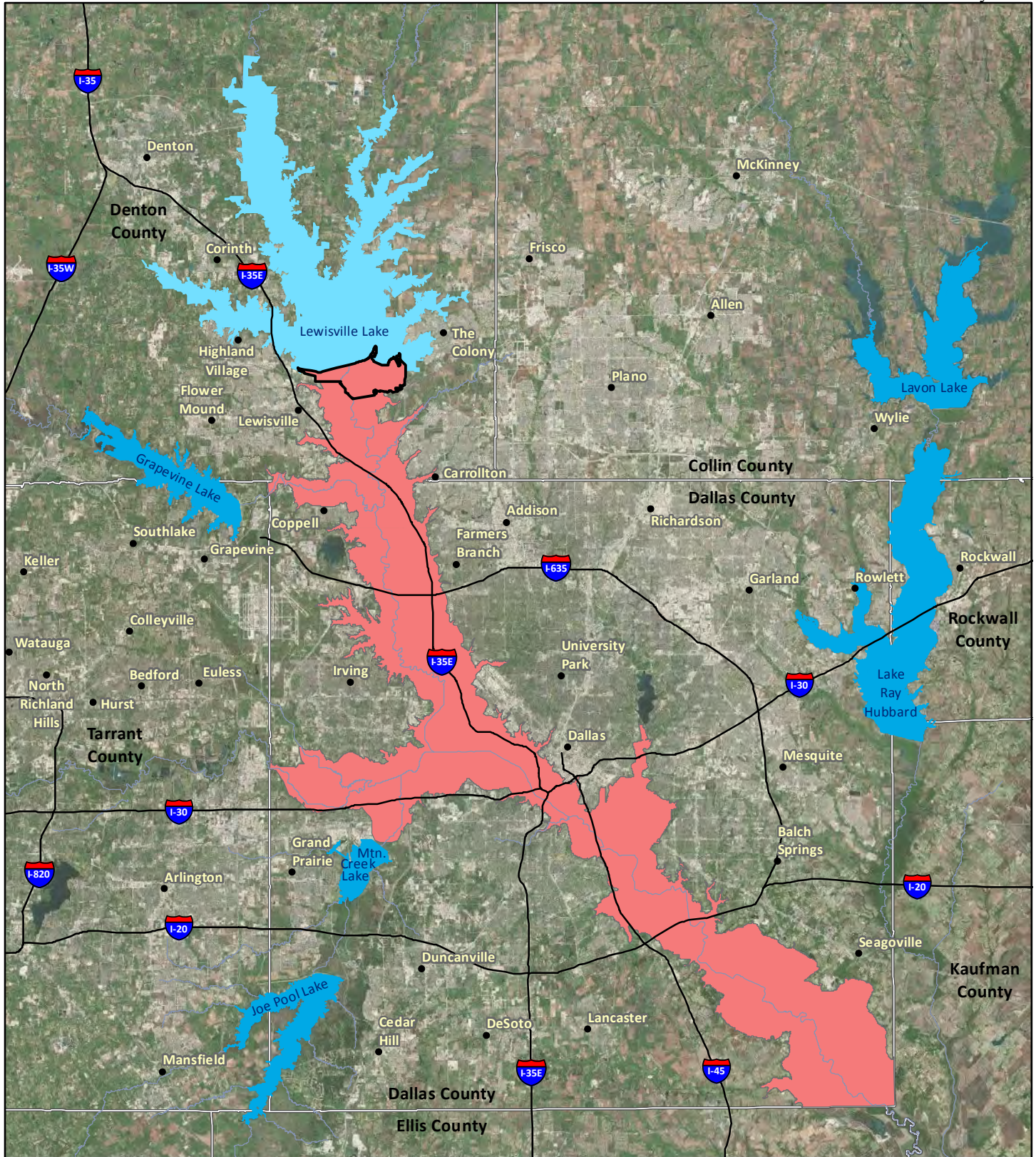


Figure 1-1. Lewisville Dam Safety Modifications Study Area

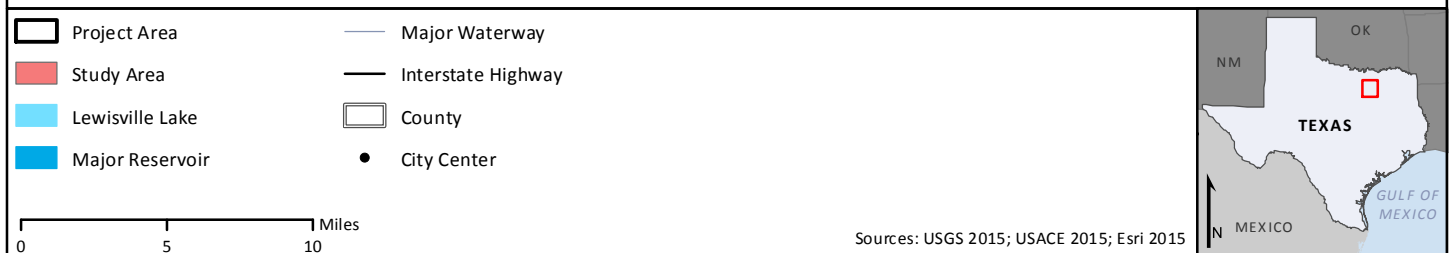



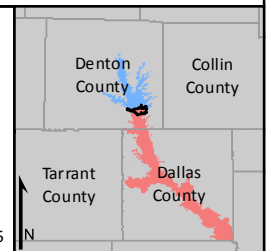




Figure 1-2. Major Features of Lewisville Dam and Project Area

-  Project Area
-  Study Area
-  Road

0 0.25 0.5 Miles



Sources: USACE 2015; Esri 2015

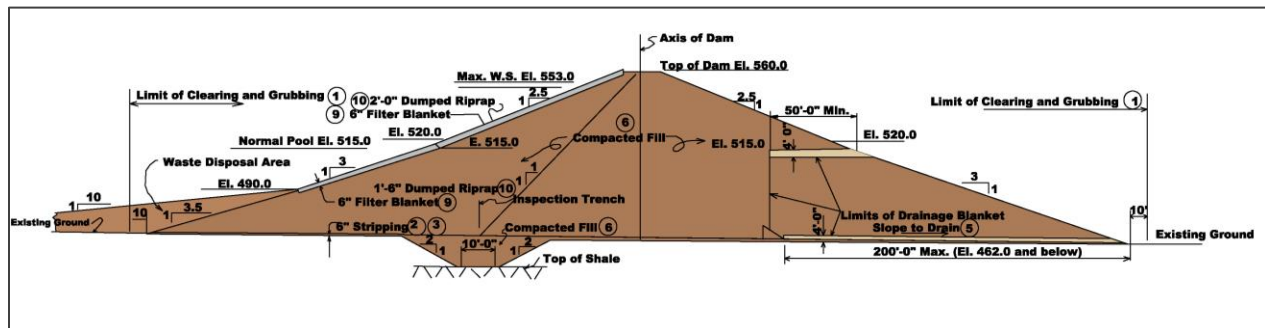
A total of 599,000 acre-feet of water (at conservation pool) is stored in Lewisville Lake for municipal and industrial purposes. An additional 325,700 acre-feet is allocated for floodwater storage. The Cities of Dallas and Denton contributed funds for construction in order to provide citizens with a 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

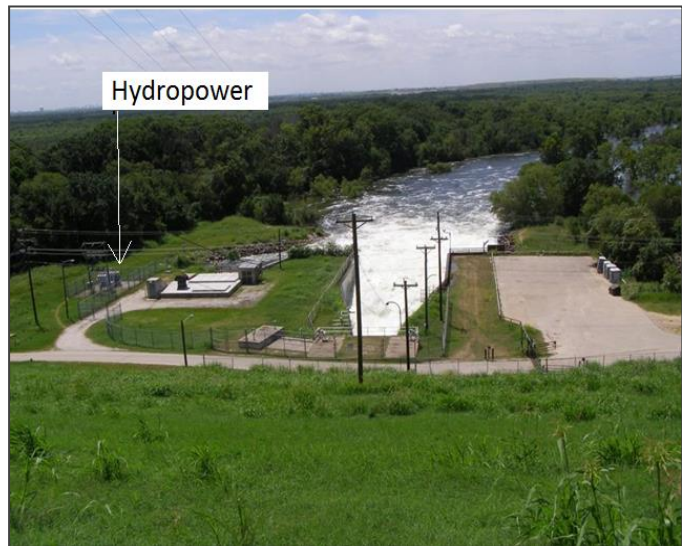


approach slab and walls are a reinforced concrete U-channel approximately 32 feet wide. The average height of the walls is 25 feet, and a 36-foot-long reinforced concrete wing wall is located on the upstream end of each wall. The reinforced concrete intake structure is approximately 113 feet high from 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-foot-wide by 21.5-foot-long by 27.75-foot-high valve rooms for each of the 5-foot diameter service conduits (Figure 1-4).

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



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

### **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-foot-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 as 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, 11 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 has reviewed this EA and issued a Coordination Act Report with their final findings. The findings of the USFWS in the Coordination Act Report have been 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 resources from the implementation of the Proposed Action to the THC. The THC's findings and final determination of the analysis have been incorporated into the USACE's decision document.

The public review period for this EA began on September 16, 2016. Agency comments were received from the THC, Texas Commission on Environmental Quality (TCEQ), USFWS, and Texas Parks and Wildlife Department (TPWD). The THC concurred with the findings of the EA. The USFWS concurred with the findings of the EA, and clarified that this project is not authorized for bird mortality for species protected under the Migratory Bird Treaty Act (MBTA). The TCEQ likewise concurred with the findings of the EA, and recommended the addition of a special conservation measure regarding debris disposal; this measure is included in the EA. A subsequent phone conversation with the TCEQ on November 1, 2016 confirmed that no state water quality certification (CWA Section 401) would be required for this project.

The TPWD requested more detailed figures of the area of impact, proposed modifications to erosion control special conservation measures, recommended surveys for state-listed mussels, and requested measures be added for the reporting and relocation of aquatic species subject to disturbance from Proposed Action activities. The USACE offered TPWD a site visit to review the sites at issue. Erosion control measures have been modified as requested. No aquatic surveys are included in the Proposed Action, as impacts to benthic communities would be negligible (refer to Section 4.4).

## **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.

#### Lewisville Aquatic Ecosystem Research Facility

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 Plant 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.

#### Lewisville Lake Environmental Learning Area

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 Project 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 was made publicly available on September 16, 2016. Interested parties were able to 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 also hosted 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 included 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.

The public meeting was an open house format attended by 23 members of the public. Project team members and subject matter experts were on hand to answer questions. One comment was received at the public meeting and one comment was submitted via email after the meeting.

The comment received at the meeting expressed concern that the Proposed Action would increase the occurrence of high flows greater than 15,000 cubic feet per second (cfs), which could adversely impact the municipal rail lines managed by Denton County Transportation Authority. The Proposed Action would not alter lake storage capacity or flood stage levels from currently existing standards. Release frequency at the spillway is driven by weather conditions within the watershed.

The comment received via email concerned flooding at Sandy Lake Road and at Carrollton Indian Creek golf course downstream of the Project Area. The comment is out the scope of the Proposed Action. Releases at Lewisville Lake are made based on public safety and the design capacity of Lewisville Lake. Public safety remains the primary mission of the USACE management of the flood control facilities at Lewisville Lake. Design capacity would not be altered under the Proposed Action.

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.

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## CHAPTER 2

# PROPOSED ACTION AND ALTERNATIVES

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### 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 PFM's 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 accompany the Dam Safety Modification Report for the Lewisville Lake Dam Safety Modification Project.

The following sections of this chapter document the alternative development process, describe the action alternatives, discuss alternatives considered and/or evaluated in this EA, and present the anticipated general construction schedules envisioned for the alternative 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 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 PFM's 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-level 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**

### **2.2.2.1 Risk-Driving Failure Modes**

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.

#### 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.

#### *Remediation Measures Considered for PFM 4A (Seepage Area 1)*

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 it 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, 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.

### 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 overlay 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 overlay or anchor stability measures. Construction would take approximately 1 year, if water does not flood the construction area.

#### 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 stabilize 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.

### **2.2.2.2 Non-risk Driving Failure Modes**

In the course of alternative development, the USACE Dam Safety Oversight Group requested the project team review additional items that are not considered risk driving failure modes, that is, PFM 2, PFM 8, and PFM 10. These measures would take advantage of design and construction efficiencies, reduce future maintenance needs, and reduce risk.

#### 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. An economic study determined that there would be substantial cost savings for the USACE by implementing PFM 8 and reducing the frequency of potential slides when compared to the cost of periodic slide repair.

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.

#### 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          |
| Borrow Volume Needs (x1,000 cubic feet) |   |      | <b>646</b>  | <b>561</b> | <b>366</b> | <b>340</b> | <b>366</b> | <b>340</b> | <b>329</b> | <b>329</b> |

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. A preliminary environmental evaluation of the construction area footprints determined that construction areas and access roads would be identical for all combinations, and thus so would habitat and cultural resource impacts. With the decision to evaluate to most impactful borrow site usage, the similarity in footprint was such that differences among combinations would be negligible. This is because, while borrow material needs may vary among the combinations, the borrow areas would be the same; the difference in borrow needs would result in different borrow area depths. As the geotechnical analysis determined that the potential borrow material is fairly consistent to a depth of more than 25 feet, and the water table is likewise 25 feet, varying depths do not constitute real differences in environmental impact. For a more detailed discussion of these findings, refer to Sections 3.2 and 4.2. 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.

Because environmental factors were indistinguishable among combinations considered, the evaluation of PFM measures was focused on 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 starting on the northern end of Borrow Site B and moving southward.

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.

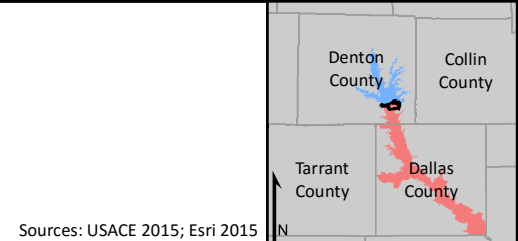
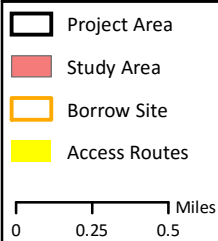
The borrow sites would be used for disposal of any clean fill created through the implementation of the PFM remediation measures. Any fill that is not suitable for disposal on site would be disposed of at an appropriate landfill facility.

### **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.



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



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 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 1- to 2-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.

The proposed habitat measures are a project feature proposed under the USACE’s mission of environmental stewardship for lake project lands. No compensatory mitigation is required or proposed for any part of the Proposed Action.

### **2.3.2.10 Implementation Schedule**

Construction would be implemented over the course of approximately 7 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.

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## CHAPTER 3

# AFFECTED ENVIRONMENT

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### 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. Construction impacts for biological resources are evaluated in Section 4.4.2.1, but are quantitative modelled using USFWS Habitat Evaluation Procedures (HEP) methodologies. 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. 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.

Overnight construction activities may occur at the spillway, 1, 475 feet from the nearest residential development. Activities would likely be limited to cement mixing and pouring, as well as some truck traffic. Noise meters along East Hill Park Road would be installed and monitored to ensure night time noise levels at the residences do not exceed 60 A-weighted decibels.

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 construction contractor(s) would be required to prepare a Stormwater Pollution Prevention Plan (SWPPP), an Environmental Protection Plan (EPP), and a Contingency Action Plan (CAP). 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.

The Pier 121 Marina is located more than 600 feet outside of the Project Area. While there is currently no evidence to suggest the presence of hazardous materials within the Project Area, it is possible that hazardous materials associated with marina operations may have spread to the sediments within the Project Area. If, in the course of project implementation, there are any indications of hazardous materials in the sediments, then the avoidance and minimization measures identified in the CAP (refer to Chapter 5) would apply.

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 construction-related activities; however, the CAP 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)

### Primary Formations

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**

| <i>Soil Types</i>           | <i>Descriptions</i>   |
|-----------------------------|---|
| 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.

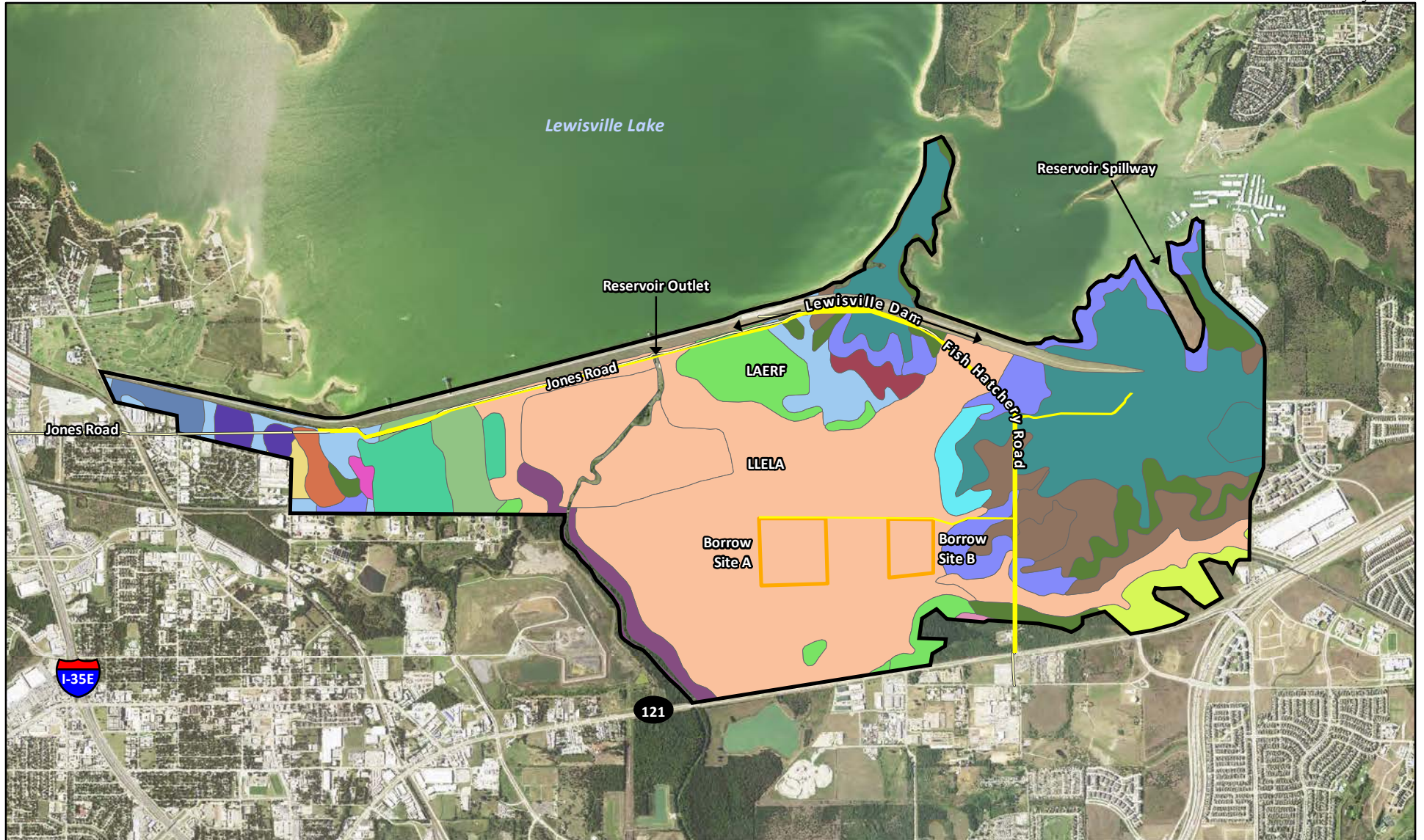
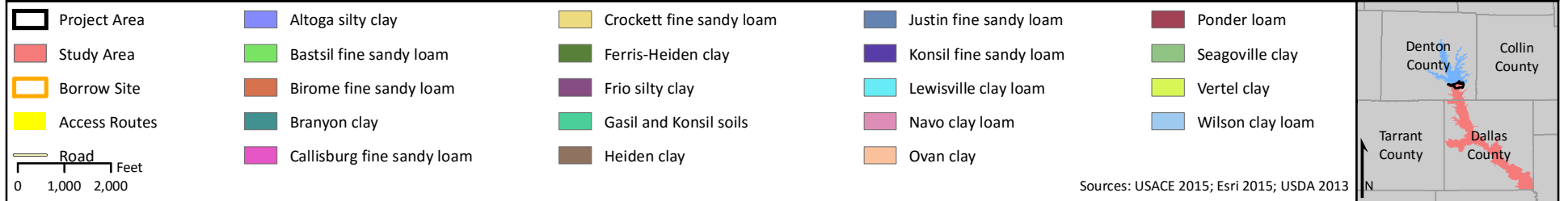


Figure 3.2-1. Existing Soils in the Vicinity of the Project Area



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).

### 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 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 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.

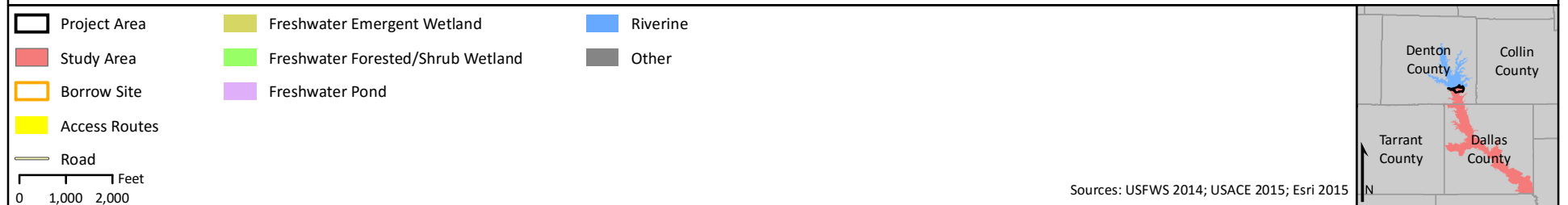
The portion of the Project Area below the dam includes palustrine emergent, scrub-shrub, and forested wetlands, as well as various types of fringe wetlands associated with the Elm Fork of the Trinity River and smaller tributaries. LLELA and LAERF routinely perform wetland restoration activities in wetlands 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 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.



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



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 waters of the U.S.

#### **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 1312.3 feet 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**

| <i>Water Body Segment</i>                                   | <i>Parameter of Concern</i> | <i>Level of Concern*</i> | <i>Water Body Use of Concern</i> |
|---|-----------------------------|--------------------------|----------------------------------|
| 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.  
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).

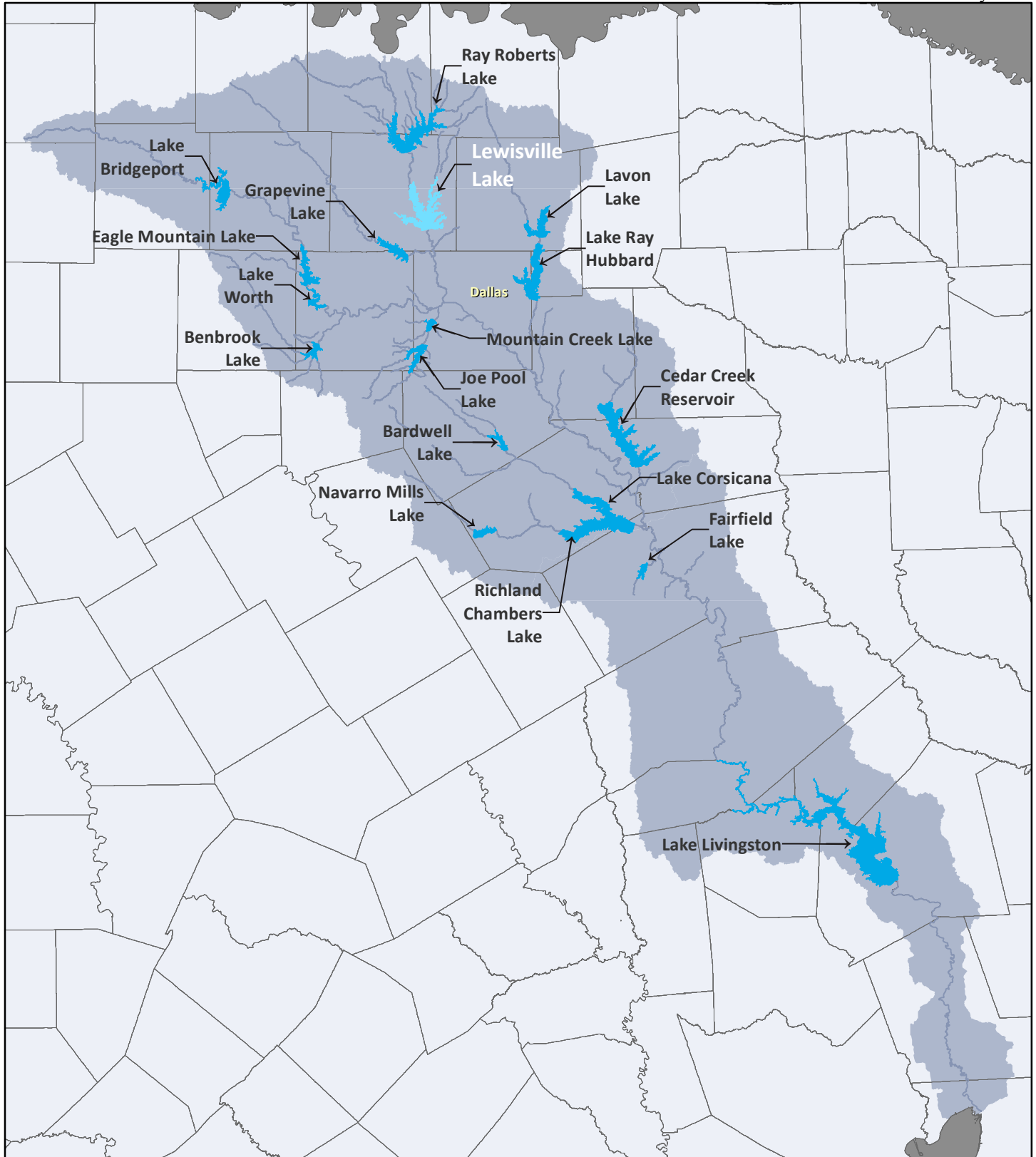
**Table 3.3-2. Key Downstream Control Points**

| <i>River Channel Control and USGS Capacity</i> | <i>Control Stage (feet)</i> | <i>Control Capacity (cubic feet per second)</i> |
|--|-----------------------------|---|
| 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  |

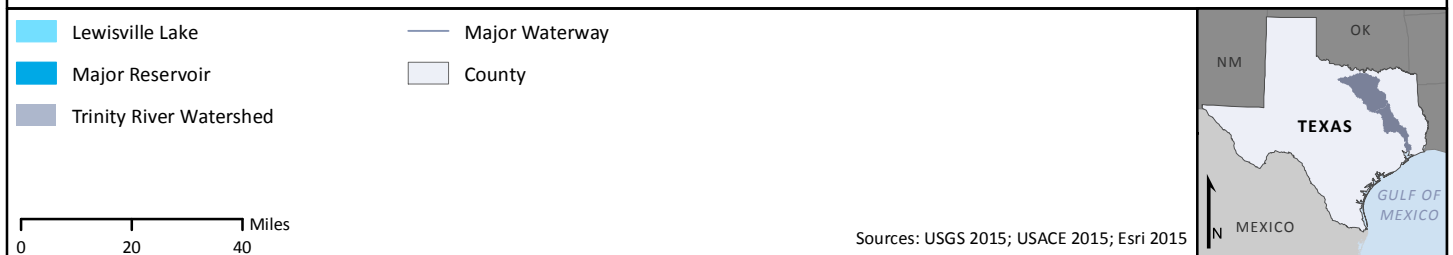
*Note:* USGS = U.S. Geological Survey.

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 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**



Sources: USGS 2015; USACE 2015; Esri 2015

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 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 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.



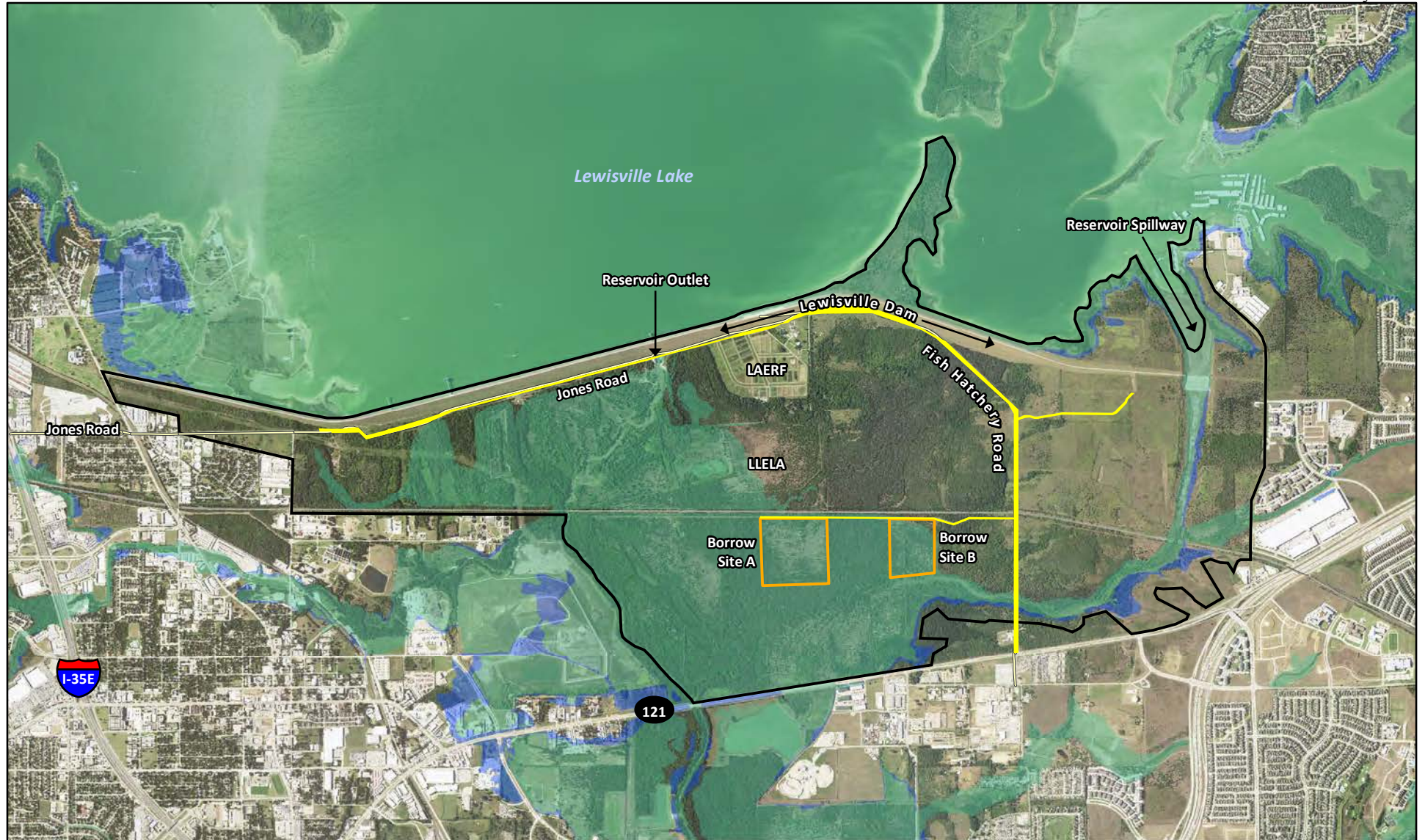


Figure 3.3-3. Floodplains in the Project Area



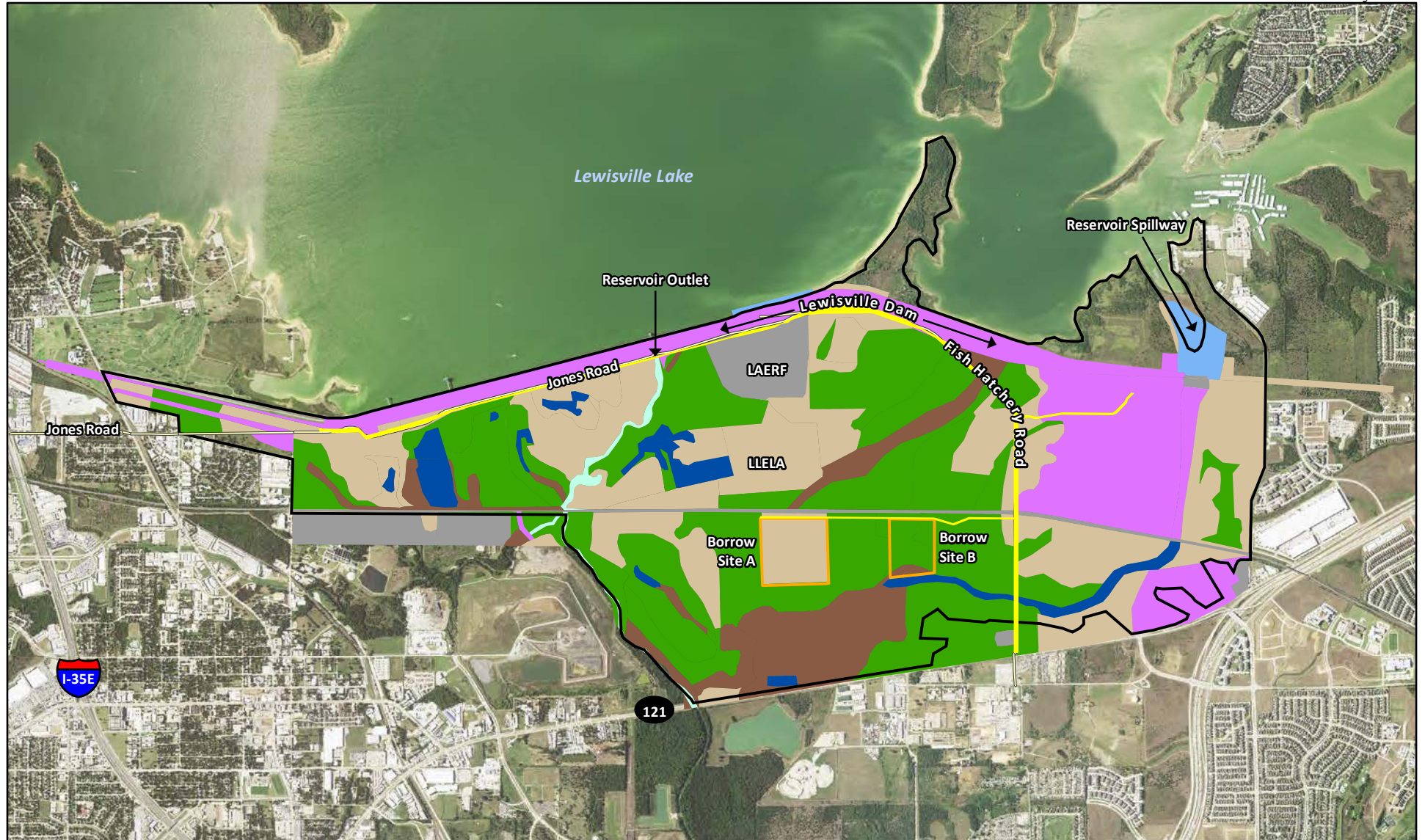
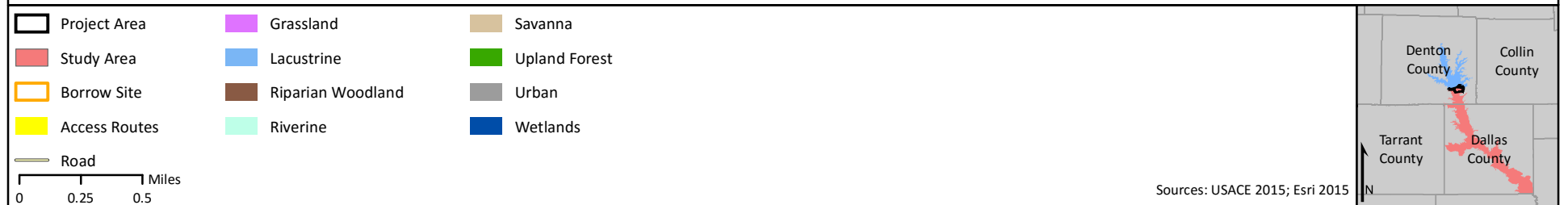


Figure 3.4-1. Habitat Types within the Project Area



### 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 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 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 SH-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 illinoensis*), 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 azedarach*), 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.

### Wildlife

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. While it is likely that some bats use the Project Area, no bats or evidence of bat usage was identified on various site visits to the Project Area or by lake managers at USACE, nor was there any concern regarding bat species or any critical bat habitat expressed by either USFWS or TPWD. 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 IH-35 makes it particularly important for migrating monarch butterflies. The IH-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**

| <i>Habitat Types</i> | <i>HSI</i> | <i>Baseline HU</i> |
|----------------------|------------|--------------------|
| 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               |
| <b>Total</b>         | <b>N/A</b> | <b>88.66</b>       |

*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. It is worth noting that the wetlands as described in this Biological Resources analysis differ slightly from those previously described in the Water Resources Section 3.3.4.1. This is due to different data sources being used. The data source for the Water Resources analysis is the National Wetlands Inventory, whereas the Biological Resources analysis is based on the habitats satisfying HEP modelling criteria for wetlands. No wetland delineation was completed as part of this EA.

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**

##### Federal and State Listed Threatened and Endangered Species

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**

| <i>Species</i>   | <i>Habitat</i>  | <i>Federal Status</i> | <i>State Status</i> | <i>Occurrence in the Project Area</i>   |
|--|---|-----------------------|---------------------|---|
| <b>Birds</b>   |   |                       |                     |   |
| American Peregrine Falcon ( <i>Falco peregrinus anatum</i> ) | 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 ( <i>Haliaeetus leucocephalus</i> )               | 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 ( <i>Sternula antillarum</i> )                    | 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 ( <i>Anthus spragueii</i> )                  | 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 coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges. | C                     |                     | Potential migrant.  |
| White-faced Ibis ( <i>Plegadis chihi</i> )                   | 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 ( <i>Grus 3-27mericana</i> )                  | 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 ( <i>Mycteria 3-27mericana</i> )                  | Forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water; usually roosts in tall snags.  |                       | T                   | Potential migrant.  |
| <b>Mollusks</b>  |   |                       |                     |   |
| Louisiana Pigtoe ( <i>Pleurobema riddellii</i> )             | 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.   |

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

| <i>Species</i>  | <i>Habitat</i>  | <i>Federal Status</i> | <i>State Status</i> | <i>Occurrence in the Project Area</i>   |
|---|---|-----------------------|---------------------|---|
| Sandbank Pocketbook ( <i>Lampsilis satura</i> )           | 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 ( <i>Potamilus amphichaemus</i> )      | 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.  |
| <b>Reptiles</b>   |   |                       |                     |   |
| Texas Horned Lizard ( <i>Phrynosoma cornutum</i> )        | 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 ( <i>Crotalus horridus</i> ) | 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**

| <i>Species</i>   | <i>Habitat</i>  | <i>Occurrence in the Project Area</i>   |
|--|---|---|
| <b>Birds</b>   |   |   |
| Arctic peregrine falcon<br>( <i>Falco peregrinus tundrius</i> )  | 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<br>( <i>Ammodramus henslowii</i> )             | 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<br>( <i>Athene cunicularia hypugaea</i> )  | 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.  |
| <b>Mammals</b>   |   |   |
| Plains spotted skunk<br>( <i>Spilogale putorius interrupta</i> ) | 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. |
| <b>Reptiles</b>  |   |   |
| Texas garter snake<br>( <i>Thamnophis sirtalis annectens</i> )   | 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.    |
| <b>Plants</b>  |   |   |
| Glen Rose yucca<br>( <i>Yucca necopina</i> )                     | Grasslands on sandy soils and limestone outcrops.   | Not likely due to lack of habitat.  |
| Topeka purple-coneflower<br>( <i>Echinacea atrorubens</i> )      | 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 Arctic 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.

USACE provides further guidance on the management of habitats. ER 1130-2-540, dated November 15, 1996 revised August 11, 2008, *Project Operations - Environmental Stewardship Operations and Maintenance Policies*, establishes land management policy for USACE-administered project lands and water, based on various authorizing legislation and the principles of good environmental stewardship. Engineering Pamphlet 1130-2-540, dated November 15, 1996 revised August 11, 2008, *Project*

*Operations - Environmental Stewardship Operations and Maintenance Policies*, establishes guidance for the management of environmental stewardship related operations and maintenance activities at USACE civil works water resource projects and supplements ER 1130-2-540. While neither of these documents speak specifically to invasive species, they do speak to the USACE mission to improve habitats and support native vegetation and wildlife, a goal which necessarily requires invasive species management.

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 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 IH-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**

| <i>Dates above Spillway Crest</i> | <i>Peak Elevation (feet)</i> | <i>Time Above Elevation.<br/>532.0 feet</i> |
|-----------------------------------|------------------------------|---|
| 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<sub>3</sub>), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matter less than or equal to 2.5 microns in aerodynamic diameter (PM<sub>2.5</sub>), particulate matter less than or equal to 10 microns in aerodynamic diameter (PM<sub>10</sub>), 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<sub>3</sub> (commonly known as “smog”) created by chemical reactions between volatile organic compound (VOCs) and oxides of nitrogen (NO<sub>x</sub>) 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<sub>2</sub> is a highly reactive gas produced primarily from the burning of fossil fuels. NO<sub>2</sub> 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<sub>2</sub> is linked with a number of adverse effects on the respiratory system (USEPA 2016a).

**Sulfur Dioxide.** SO<sub>2</sub> emissions are primarily from fossil fuel combustion at power plants (73%) and other industrial facilities (20%). Smaller sources of SO<sub>2</sub> 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<sub>2</sub> 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 [ $\mu\text{g}/\text{m}^3$ ]) 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<br>[Final Rule citation]   | Averaging Time             | NAAQS                        |                             |
|--|----------------------------|------------------------------|-----------------------------|
|  |                            | Primary                      | Secondary                   |
| Ozone (O <sub>3</sub> )<br>[73 FR 16436, Mar 27, 2008]<br>[80 CFR 65292, Oct 26, 2015]           | 8-hour                     | 0.070 ppm<br>(2015 standard) | Same as<br>Primary Standard |
| Carbon Monoxide (CO)<br>[76 FR 54294, Aug 31, 2011]  | 8-hour                     | 9 ppm                        | -                           |
|  | 1-hour                     | 35 ppm                       | -                           |
| Nitrogen Dioxide (NO <sub>2</sub> )<br>[75 FR 6474, Feb 9, 2010]<br>[61 FR 52852, Oct 8, 1996]   | Annual Average             | 53 ppb                       | Same as<br>Primary Standard |
|  | 1-hour                     | 100 ppb                      | -                           |
| Sulfur Dioxide (SO <sub>2</sub> )<br>[75 FR 35520, Jun 22, 2010]<br>[38 FR 25678, Sept 14, 1973] | 1-hour                     | 75 ppb                       | -                           |
|  | 3-hour                     | -                            | 0.5 ppm                     |
| Particulate Matter (PM <sub>10</sub> )<br>[78 FR 3086, Jan. 15, 2013]                            | 24-hour                    | 150 µg/m <sup>3</sup>        | Same as<br>Primary Standard |
| Particulate Matter (PM <sub>2.5</sub> )<br>[78 FR 3086, Jan. 15, 2013]                           | Annual Average             | 12 µg/m <sup>3</sup>         | 15 µg/m <sup>3</sup>        |
|  | 24-hour                    | 35 µg/m <sup>3</sup>         | Same as<br>Primary Standard |
| Lead (Pb)<br>[73 FR 66964, Nov 12, 2008]   | Rolling 3-month<br>Average | 0.15 µg/m <sup>3</sup>       | Same as<br>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<sub>3</sub> 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<sub>x</sub> (40 CFR § 93.153). VOCs and NO<sub>x</sub> are precursors to the formation of O<sub>3</sub>.

The Dallas-Fort Worth O<sub>3</sub> 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<sub>3</sub> 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<sub>3</sub> 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 <sub>3</sub> 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 <sub>2.5</sub> measured in µg/m <sup>3</sup> | 12.9           | 56             | 9.9            | 110            | 10             | 86             |
| PM <sub>10</sub> measured in µg/m <sup>3</sup>  | 25.6           | 181            | 27.6           | 717            | 23.3           | 172.8          |
| SO <sub>2</sub> measured in ppb                 | 0.2            | 7.5            | 0.3            | 6.4            | 0.3            | 5.7            |
| NO <sub>2</sub> 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, semiconductor 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<sub>x</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub>. The largest regional sources of VOCs and NO<sub>x</sub> 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<sub>3</sub> levels, including green fleet/vehicles, ordinances, commute solutions, and outreach programs. The Dallas-Fort Worth region has experienced a steady decline in NO<sub>x</sub> 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**

| <i>Law/Regulation</i>             | <i>Title</i>  |
|-----------------------------------|---|
| 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<br>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 19<sup>th</sup> 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.

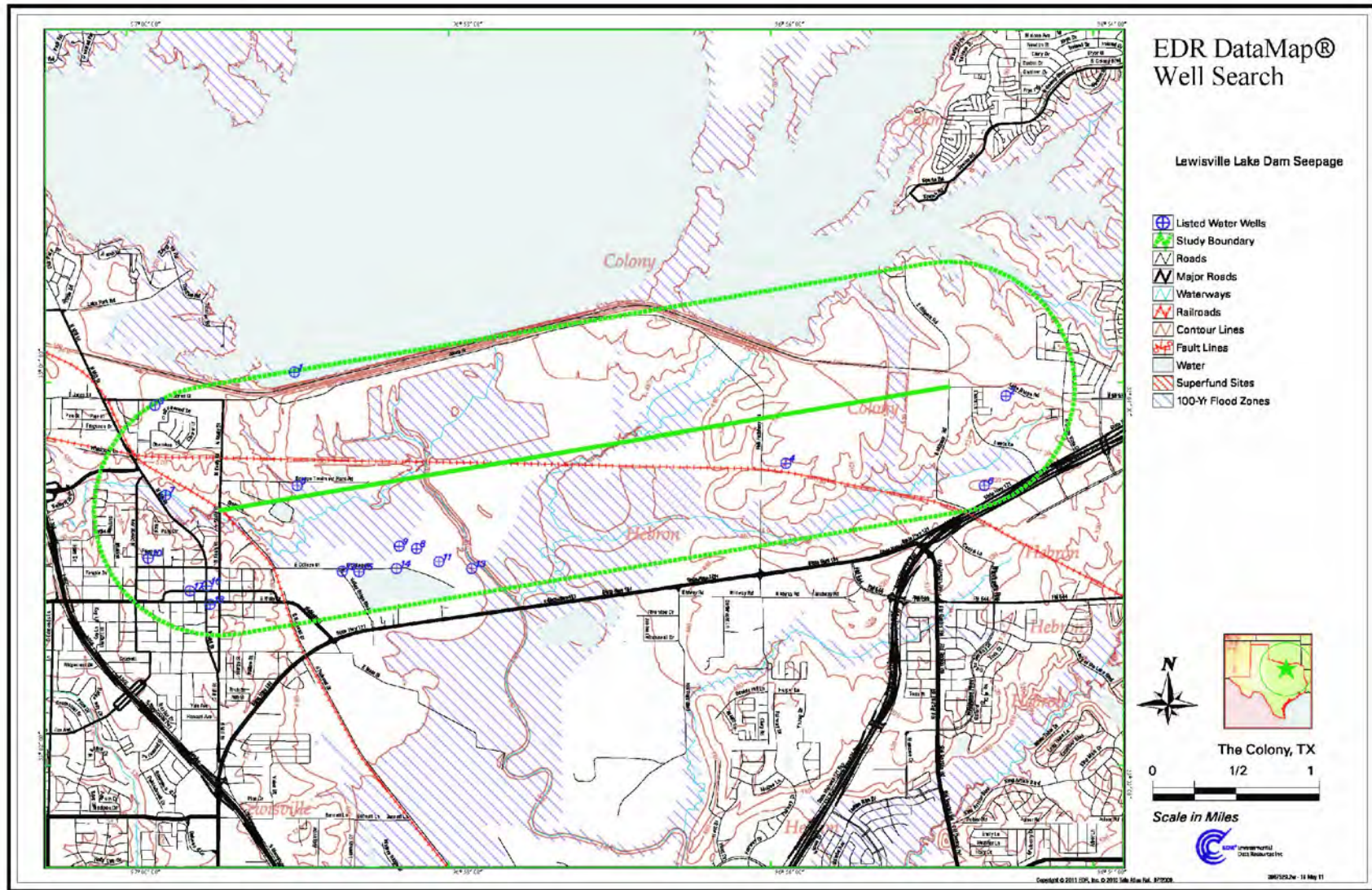
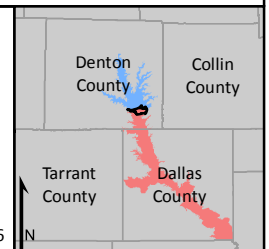


Figure 3.8-1. EDR Corridor Map with Well Locations

- Project Area
- Study Area



Sources: USACE 2015; Esri 2015; EDR 2016

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**

| <i>Utility Management Agency/Company</i> | <i>Description of Utility</i>   |
|--|---|
| 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  |
| City of The Colony                       | 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 |
|  | 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.

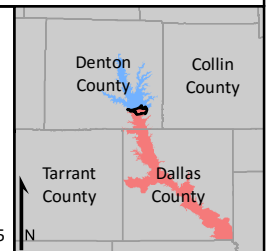


Figure 3.8-2. Existing Utilities in the Vicinity of the Project Area

- Project Area
- Borrow Site
- Access Routes
- Road
- Electrical Line
- Sewer Line
- Stormwater Line
- Water Line

0 1,000 2,000 Feet

Sources: USACE 2015; Esri 2015



## 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.

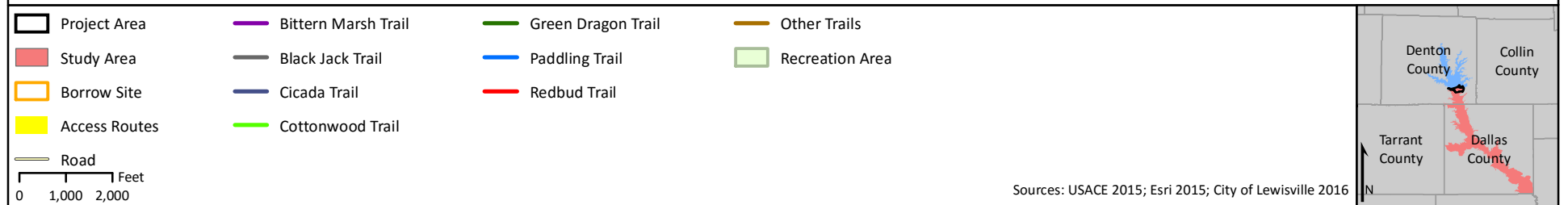
There are currently 34 developed parks and/or lake access areas around Lewisville Lake that provide areas for water-related recreation. The parks and lake access areas include a variety of recreation facilities for public use. The majority of the parks listed in ROI are located at the lake's edge and 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 4 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.

#### Aquatic Recreational Resource Activities

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

#### State

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.

### Regional

*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 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, disproportionately 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 socioeconomic 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, 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 9<sup>th</sup> largest county in Texas and 88<sup>th</sup> largest in the nation and Dallas County is the 2<sup>nd</sup> largest county in Texas and the 9<sup>th</sup> largest in the nation. Figure 3.11-1 displays the population data by census block as of 2014, with minimal change from the 2012 data displayed in the table below.

**Table 3.11-1. Area Populations, 2012**

| <i>Region</i>  | <i>Population</i> |
|----------------|-------------------|
| ROI            | 758,956           |
| Denton County  | 667,934           |
| Dallas County  | 2,379,214         |
| State of Texas | 25,208,897        |

Source: U.S. Census Bureau 2012.

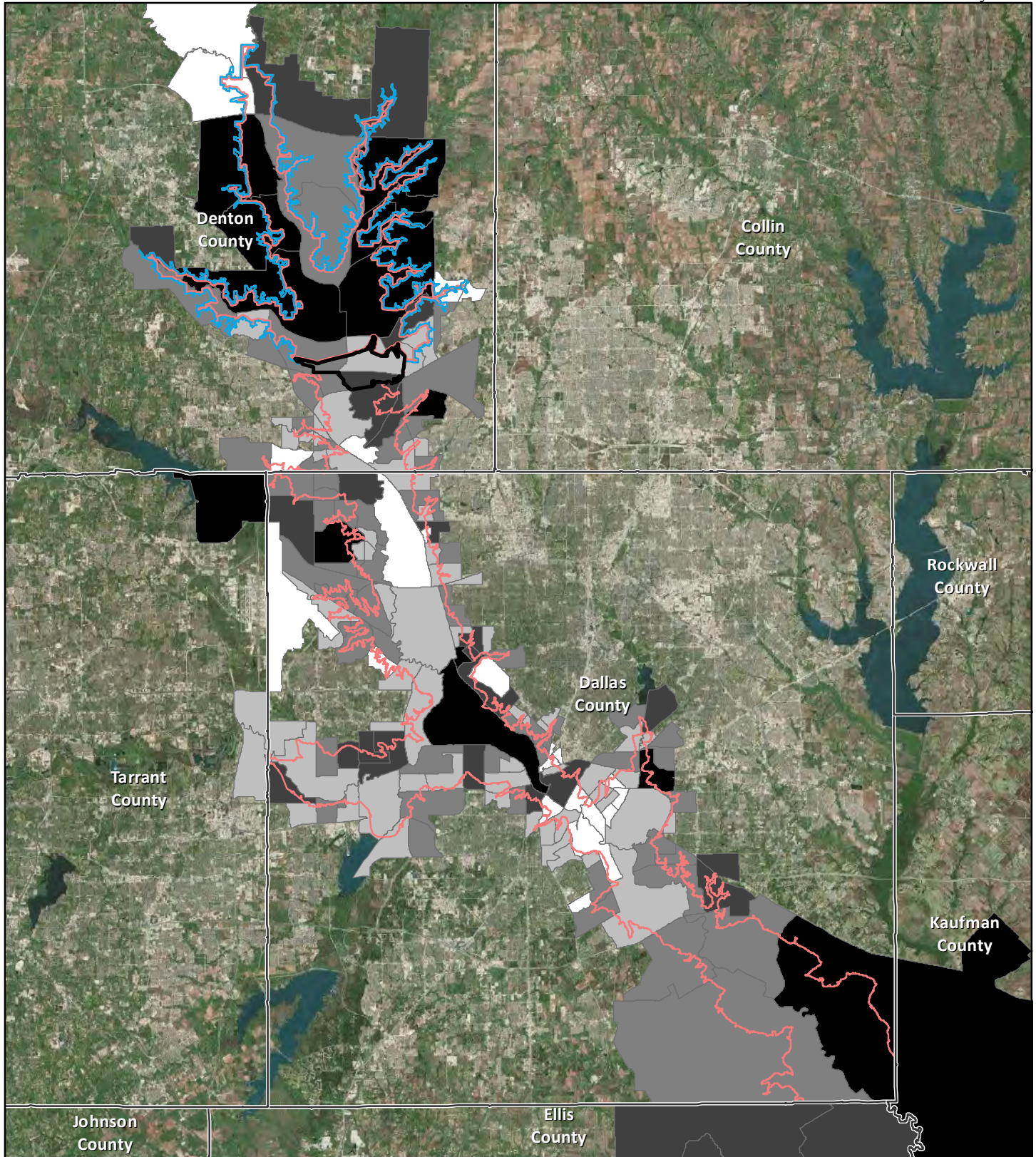
As shown in Table 3.11-2, the 2012 population in the ROI consisted of 39.8% Hispanic or Latino, 31.7% white, and 19.0% Black or African American. A small portion of the population consisted of Asian, Native Hawaiian and Other Pacific Islander, American Indian, and Alaska Native, Some other Race, and 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**

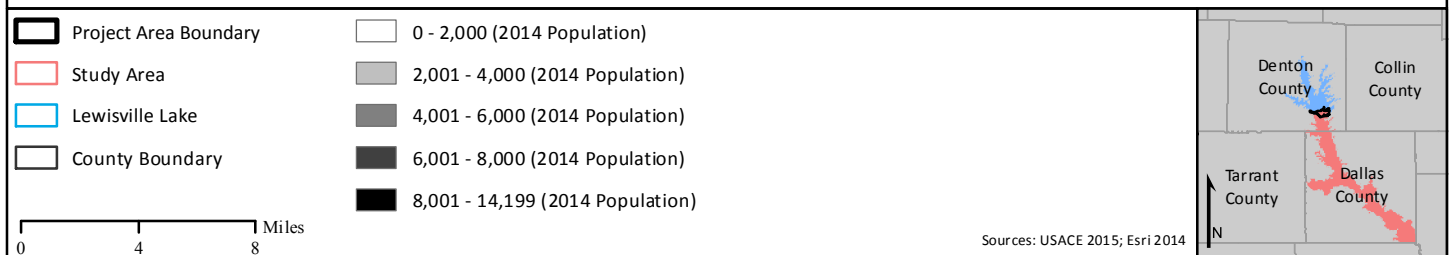
| <i>Race and Ethnicity</i>                  | <i>ROI</i> | <i>Denton County</i> | <i>Dallas County</i> | <i>State of Texas</i> |
|--|------------|----------------------|----------------------|-----------------------|
| White                                      | 31.7%      | 64.4%                | 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**

| <i>Industry</i>                                       | <i>ROI</i> | <i>Denton County</i> | <i>Dallas County</i> | <i>State of Texas</i> |
|---|------------|----------------------|----------------------|-----------------------|
| 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**

| <i>Education Level</i>      | <i>ROI</i> | <i>Denton County</i> | <i>Dallas County</i> | <i>State of Texas</i> |
|-----------------------------|------------|----------------------|----------------------|-----------------------|
| 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**

| <i>Educational Attainment</i>         | <i>ROI</i> | <i>Denton County</i> | <i>Dallas County</i> | <i>State of Texas</i> |
|---------------------------------------|------------|----------------------|----------------------|-----------------------|
| 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:* <sup>1</sup> 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**

| <i>Housing Occupancy</i> | <i>ROI</i> | <i>Denton County</i> | <i>Dallas County</i> | <i>State of Texas</i> |
|--------------------------|------------|----------------------|----------------------|-----------------------|
| 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

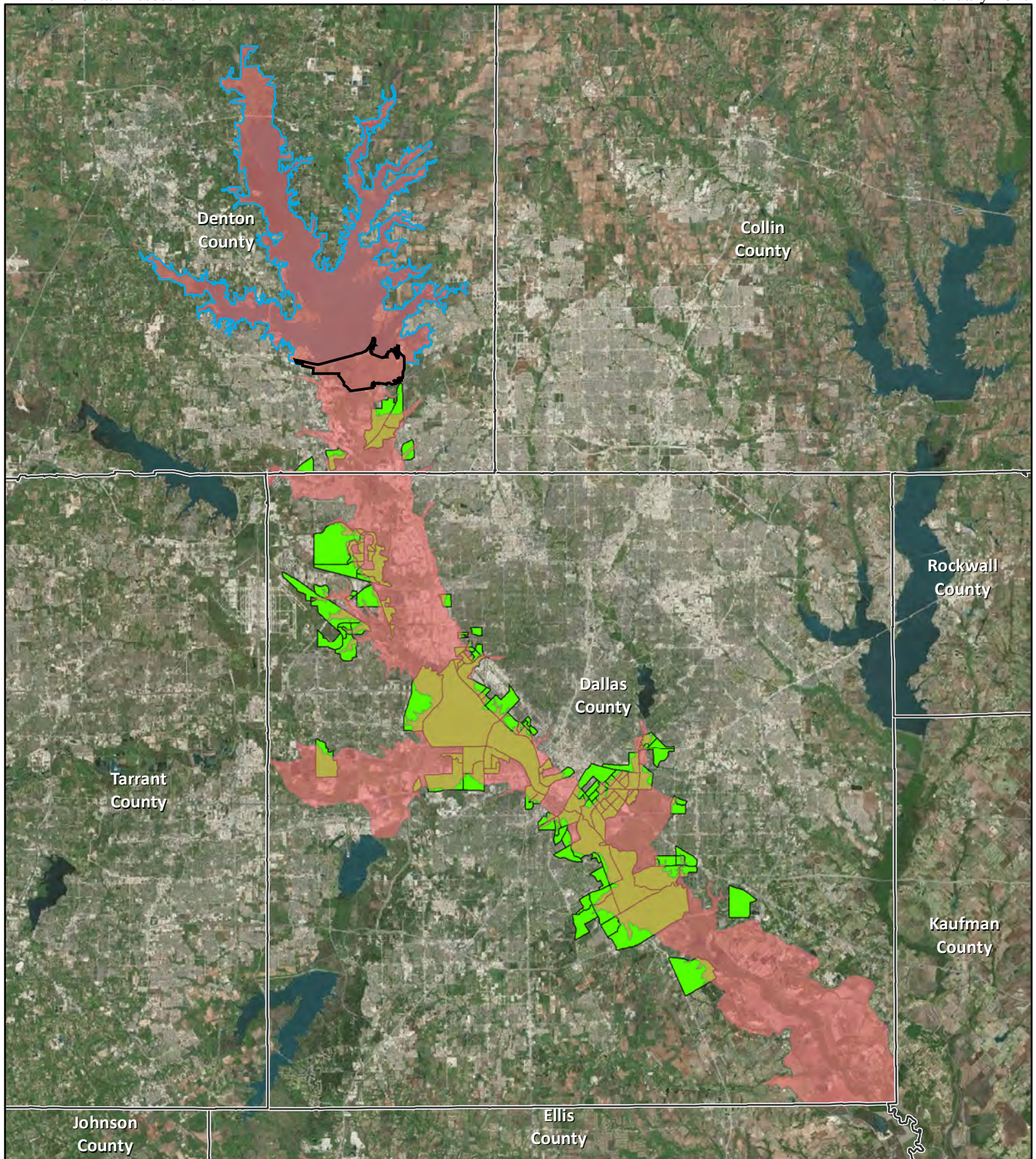
A census block group is considered an environmental justice minority population area if 50% or more of the residents are Black or African American, Asian, American Indian or Native Alaskan, Native Hawaiian or Other Pacific Islander, or Hispanic or Latino. There are several of these census block groups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

#### Low-Income Population Areas

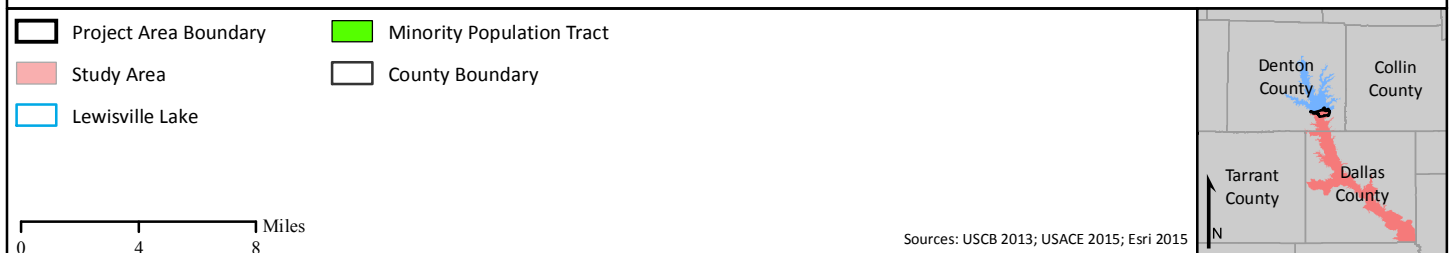
A census block group is considered an environmental justice low-income population area if 20% or more of the households within the block group have incomes below the poverty line, as identified in U.S. Census Bureau publications. There are several of these census block groups in the ROI (Figure 3.11-3).

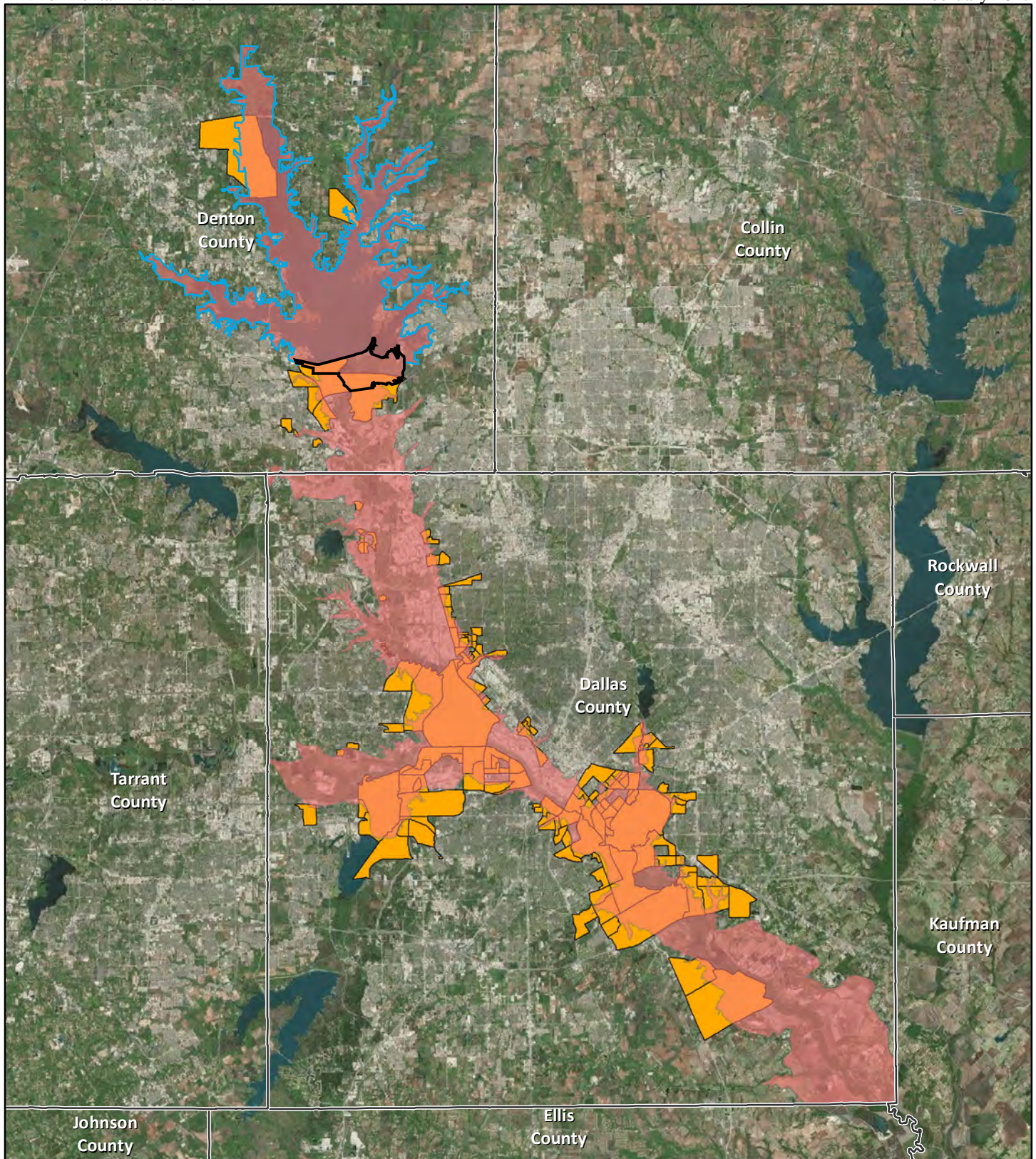
#### Areas Used by Children

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 *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews* issued by the CEQ on August 1, 2016 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 ranges 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

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### 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. No compensatory mitigation is required or proposed for any part of the Proposed Action.

#### 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 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 freshwater emergent wetland, or less than 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 an open water. 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 (Figure 4.3-1), 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 open water associated with Lewisville Lake, however, this proposed fill material would return the dam cross section to original design specifications. The total volume of material to be discharged into open water would be 8,066 cubic yards. 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.



**Figure 4.3-1 Spillway Channel Downstream of the Apron**

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 wetlands or water. 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. No compensatory mitigation is required or proposed for any part of the Proposed Action. 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. These avoidance activities would protect not only migratory birds, but also any bats that may use the action area during their pupping seasons. 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    |
| <b>Riparian Woodland</b>          |                     |      |       |       |       |       |       |
| 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     |
| <b>Upland Forest</b>              |                     |      |       |       |       |       |       |
| 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 |
| <b>Wetland</b>                    |                     |      |       |       |       |       |       |
| 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  |
| <b>Grassland</b>                  |                     |      |       |       |       |       |       |
| 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 |
| <b>Savanna – Habitat Measures</b> |                     |      |       |       |       |       |       |
| 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 |
| <b>Savanna – All Other</b>        |                     |      |       |       |       |       |       |
| 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  |
| <b>Riverine</b>                   |                     |      |       |       |       |       |       |
| 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. At the same time, the LLELA as a whole include substantial riparian woodlands of higher quality than that which is subject to impact here. 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. The proposed habitat measures are a project feature proposed under the USACE’s mission of environmental stewardship. No compensatory mitigation is required or proposed for any part of the Proposed Action. 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)**

| <i>Habitat</i>             | <i>HUs</i>      |                        |               |
|----------------------------|-----------------|------------------------|---------------|
|                            | <i>Baseline</i> | <i>Proposed Action</i> | <i>Change</i> |
| 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          |
| <b>Total HU</b>            | <b>88.66</b>    | <b>121.14</b>          | <b>32.48</b>  |

#### 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    |
| <b>Riparian Woodland</b> |                     |       |       |       |       |       |       |
| 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  |
| <b>Upland Forest</b>     |                     |       |       |       |       |       |       |
| 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 |
| <b>Wetland</b>           |                     |       |       |       |       |       |       |
| 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  |
| <b>Grassland</b>         |                     |       |       |       |       |       |       |
| 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 |



**Table 4.4-3. Estimated HSI, 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    |
| <b>Savanna</b>  |                     |       |       |       |       |       |       |
| 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 |
| <b>Riverine</b> |                     |       |       |       |       |       |       |
| 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. At no point in the course of construction would the function of the Lewisville Lake flood control facilities be impaired or prevented from functioning as designed by Proposed Action implementation.

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<sub>x</sub>, or (2) increasing net mobile source emissions in excess of 250 tons per year for SO<sub>2</sub>, CO, PM<sub>2.5</sub>, or PM<sub>10</sub>.

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<sub>10</sub> emissions, 250 tons per year per pollutant was used as a comparative analysis threshold. This value is used by the USEPA in their New Source Review Permitting 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<sub>2</sub>, CO, PM<sub>2.5</sub>, and PM<sub>10</sub> 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 7-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**

| <i>Time Frame</i>                  | <i>VOCs</i>      | <i>CO</i> | <i>NO<sub>x</sub></i> | <i>SO<sub>2</sub></i> | <i>PM<sub>10</sub></i> | <i>PM<sub>2.5</sub></i> |
|------------------------------------|------------------|-----------|-----------------------|-----------------------|------------------------|-------------------------|
| <b>Total Emissions (FY18-FY20)</b> | 2.56             | 14.27     | 23.96                 | 0.29                  | 1.44                   | 1.40                    |
| <b>Annual</b>                      | 0.9              | 4.8       | 8.0                   | 0.1                   | 0.5                    | 0.5                     |
| <b>Applicable Threshold</b>        | <sup>1</sup> 100 | 250       | <sup>1</sup> 100      | 250                   | 250                    | 250                     |
| <b>Threshold Exceedance?</b>       | No               | No        | No                    | No                    | No                     | No                      |

*Note:* <sup>1</sup>The General Conformity Threshold for VOCs and NO<sub>x</sub> 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**

| <i>Time Frame</i>                  | <i>VOCs</i>      | <i>CO</i> | <i>NO<sub>x</sub></i> | <i><sup>2</sup>SO<sub>2</sub></i> | <i>PM<sub>10</sub></i> | <i>PM<sub>2.5</sub></i> |
|------------------------------------|------------------|-----------|-----------------------|-----------------------------------|------------------------|-------------------------|
| <b>Total Emissions (FY22-FY25)</b> | 0.43             | 2.80      | 3.77                  | 0.04                              | 0.24                   | 0.24                    |
| <b>Annual</b>                      | 0.1              | 0.7       | 0.9                   | 0.0                               | 0.1                    | 0.1                     |
| <b>Applicable Threshold</b>        | <sup>1</sup> 100 | 250       | <sup>1</sup> 100      | 250                               | 250                    | 250                     |
| <b>Threshold Exceedance?</b>       | No               | No        | No                    | No                                | No                     | No                      |

Note: <sup>1</sup>The General Conformity Threshold for VOCs and NO<sub>x</sub> 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<sub>x</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub>) 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<sub>x</sub> 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**

##### Downstream Inverted Filter Berm

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.

##### Collection Trench

Under the Proposed Action, an approximately 400-foot-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**

##### Downstream Inverted Filter Berm

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 be 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 7 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 4.9, *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 PFM's 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 implementation of the Proposed Action.

#### **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.

Adverse impacts associated with construction, such as noise, traffic, and dust generation would be within the LLELA Project Area, and would not impact the private lands abutting LLELA.

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**

| <i>County</i> | <i>2010</i>      | <i>2020</i>      | <i>2030</i>      | <i>2040</i>      | <i>2050</i>      | <i>2060</i>      | <i>2070</i>      |
|---------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 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          |
| <b>Total</b>  | <b>1,683,115</b> | <b>2,135,568</b> | <b>2,561,398</b> | <b>3,056,371</b> | <b>3,633,423</b> | <b>4,226,104</b> | <b>4,834,641</b> |

## 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. 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 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, EPP, and a 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 proposed habitat measures are a project feature proposed under the USACE’s mission of environmental stewardship. No compensatory mitigation is required or proposed for any part of the Proposed Action.

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**

| <i>Number</i>              | <i>Description</i>  | <i>Plan</i> |
|----------------------------|---|-------------|
| <b>Planning and Design</b> |   |             |
| 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**

| <i>Number</i>                 | <i>Description</i>  | <i>Plan</i>     |
|-------------------------------|---|-----------------|
| 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: <ul style="list-style-type: none"> <li>a. A list of the non-native/invasive plant and animal species that may occur, along with practical methods for their detection and removal.</li> <li>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.</li> </ul> | 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           |
| <b>Pre-Construction Phase</b> |   |                 |
| 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**

| <i>Number</i> | <i>Description</i>  | <i>Plan</i>     |
|---------------|---|-----------------|
| 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: <ul style="list-style-type: none"> <li>• information regarding sensitive species and habitats with the potential to occur in the area,</li> <li>• impacts that may occur,</li> <li>• conservation measures being implemented,</li> <li>• construction worker responsibilities under the ESA, and</li> <li>• avoidance and reporting procedures.</li> </ul>   | 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**

| <i>Number</i>             | <i>Description</i>   | <i>Plan</i>     |
|---------------------------|--|-----------------|
| <b>Construction Phase</b> |  |                 |
| 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, natural fiber 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**

| <i>Number</i> | <i>Description</i>   | <i>Plan</i> |
|---------------|--|-------------|
| 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         |
| 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   | CAP         |

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

| <i>Number</i> | <i>Description</i>   | <i>Plan</i> |
|---------------|--|-------------|
|               | will have frequent communication with the Lewisville Lake Office to assess the safety of operating within LLELA.   |             |
| C-23          | Create native grasslands, where possible, throughout the Project Area to replace Bermuda grass and Johnsongrass. <ul style="list-style-type: none"> <li>a. Recommend planting native grass and forb species appropriate for the soils.</li> <li>b. Plant shrub and tree mottes in savannas, and maintain them to no more than about 10% canopy cover</li> </ul>  | 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, <i>et seq.</i> ) 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 §§ 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          | Prior to any night time construction, contractors will install and monitor noise meters along East Hill Park Road at the western boundaries of the Bella Madera and Pine Prairie Luxury Apartments residential communities. If the noise measured at the monitors exceeds 60 A-weighted decibels between the hours of 10 pm and 7 am, excessive noise generating construction activity will immediately cease until daytime hours.   | EPP         |
| C-29          | Operators will limit idling of heavy equipment to less than five minutes and verify idling limits through unscheduled inspections.   | EPP         |
| C-30          | 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-31          | 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-32          | 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**

| <i>Number</i>                                 | <i>Description</i>   | <i>Plan</i>     |
|---|--|-----------------|
| C-33  | If, in the course of construction, personnel on site see and recognize a candidate threatened or endangered species, a report of the occurrence would be filed with USACE and TPWD.  | EPP             |
| <b>Post-Construction and Operations Phase</b> |  |                 |
| 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             |
| <b>Mitigation and Monitoring Measures*</b>    |  |                 |
| 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**

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#### **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 7

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#### **7.4.10 Socioeconomics and Environmental Justice**

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## **CHAPTER 8**

### **PERSONS AND AGENCIES CONTACTED**

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#### USFWS

Sean Edwards

*Biologist – Conservation Planning Assistance*

#### THC

Mark Wolf

*Executive Director*

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## CHAPTER 9

### LIST OF PREPARERS

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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*

**Lesley Hamilton**, Air Quality, 27 years' experience  
*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*

**Teresa Rudolph**, Senior Analyst; Cultural Resources, 38 years' of experience  
*M.A., Anthropology*

**Jennifer Weitkamp**, Recreational Resources, Public Health and Safety, 20 years' experience  
*B.S., Fisheries*

**Vanessa Williford**, Geology, Topography, and Soils; Utilities, 12 years' experience  
*M.A., Sustainability and Development*

GIS & Graphic Design

**Shannon Brown**, GIS Specialist, 7 years' experience

*B.S., Environmental and Resource Science*

**Jackie Clark**, Graphic Design, 8 years' experience

*B.S., Business Administration*

**Jason Harshman**, GIS Specialist, 11 years' experience

*B.A., Geography*

Document Production

**Jackie Clark**, Production Manager, Technical Editor, 8 years' experience

*B.S., Business Administration*

**Claudia Tan**, Technical Editor, 14 years' experience

*A.A., Liberal Arts and Sciences*



## **Appendix A**

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### ***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](mailto: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](mailto: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](mailto: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](mailto:hollie.hunter@usace.army.mil). Thank you for your interest and cooperation.

Sincerely,



Eric W. Verwers  
Chief, Planning, Environmental, and  
Regulatory Division

Enclosure

**Lake Lewisville Dam - Public Scoping Meeting**

**August 20, 2013**



**Job No. 17184**

**307 W. 7<sup>th</sup> Street, Suite 1350  
Fort Worth, Texas 76102**

**817-336-3042 \* [depos@merittexas.com](mailto:depos@merittexas.com)**

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2  
3 \*\*\*\*\*  
4  
5  
6 FORT WORTH DISTRICT  
7 ARMY CORP OF ENGINEERS  
8 LEWISVILLE LAKE ENVIRONMENTAL IMPACT STATEMENT  
9 SCOPING MEETING  
10 PUBLIC FORUM  
11 AUGUST 20TH, 2013  
12 Grand Theater  
13 100 North Charles Street  
14 Lewisville, Texas 75067  
15  
16 Reported by Vicki L. Smith  
17  
18 \*\*\*\*\*  
19  
20  
21  
22  
23  
24  
25

1 subject matter experts.  
2 Thank you again for your participation.  
3 Would you like a microphone, sir?  
4 MR. PETTY: I would like to ask a  
5 question.  
6 MS. FAGERHOLM: Sure.  
7 MR. PETTY: My name is Mel Petty.  
8 MS. FAGERHOLM: Let's get the microphone,  
9 please.  
10 MR. PETTY: And I've -- hello, my name is  
11 Mel Petty, and I've been here a long time. I had the  
12 opportunity of working on this project back in 1951.  
13 And I was told when it filled up, I think, in '56, when  
14 it reached pool level, that we had leaks at that time.  
15 Does this meeting indicate that the leaks have gotten  
16 worse?  
17 MS. FAGERHOLM: Anita, would you like to  
18 handle this?  
19 MS. BRANCH: No. Oh, yeah, I'll handle  
20 it. Yes, I'll handle it. And no -- no, the leaks  
21 haven't gotten worse. But -- but you are correct.  
22 Basically, once -- once there was water back behind that  
23 dam.  
24 Water knows better than we do, because we  
25 only go through and we drill a couple little spaces,

1 MS. FAGERHOLM: Ladies and gentlemen,  
2 this concludes our formal presentation. At this time, I  
3 invite you to come up to the microphone over here or  
4 please raise your hand and a microphone will be brought  
5 over to you.  
6 I would ask that you limit your questions  
7 or comments to one per person and no more than three  
8 minutes. Questions and comments should be related to  
9 the study or the EIS, and, again, we are at the very  
10 beginning of this process so we are limited in specific  
11 details.  
12 Please state your name for the record  
13 before proceeding with your comment. Our transcriber,  
14 Ms. Vicki Smith, over here may also ask for  
15 clarification on your name or comment for the record  
16 after you have completed your comment.  
17 If you do not have the opportunity to  
18 come up in person, please drop your comment in the  
19 comment box outside or submit them by e-mail to  
20 Ms. Hollie Hunter using the contact information on the  
21 screen.  
22 Our presenters and Corp staff will remain  
23 available to take a few questions or comments one on one  
24 after the meeting. Our public affairs team will also  
25 assist media wishing to conduct interviews with the Corp

1 actually hundreds of little spaces, to know what's down  
2 there. But we can't possibly know every type of  
3 material that's down there.  
4 And so water -- water is going to find  
5 out where we -- where we didn't discover something that  
6 would have been helpful to us in the design. So you're  
7 absolutely right. As soon as the pool got up, we  
8 started getting seepage.  
9 And, so, as a result, we've had to go in  
10 over time, and we've -- we've done other things to  
11 actually help us control that. We've put in relief  
12 wells, and we've put in a system of drains. It  
13 hasn't -- it hasn't stopped it. It hasn't impacted the  
14 quantity, and, basically, we're kind of seeing that the  
15 quantity is staying the same.  
16 But, again, the consequences are what's  
17 driving this. We're worried that if we don't do  
18 something we could end up having issues later. One of  
19 the things that we've got going for us is that the  
20 seepage that's coming through that you saw shortly after  
21 the construction was finished is that it's clear.  
22 And if it's clear, that means that it's  
23 only water coming through and it's not moving soil  
24 particles. So there's not a whole lot of energy out  
25 there that actually is moving that soil out that really



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1 gives us a grave amount of concern, so.  
2 MR. PETTY: I have one more question,  
3 please. Given in the early 60s or whenever they raised  
4 the pool level up to seven foot, 515 to 522, they raised  
5 the boat ramps up, also. I was wondering if there's any  
6 consideration of lowering low water boat ramps? Is that  
7 in the plan at anytime or are they in the process of  
8 closing some of them right now?  
9 MS. BRANCH: I don't know the answer to  
10 that. Do we have someone here that can answer that?  
11 MS. FAGERHOLM: Yes, we have lake  
12 personnel available in the Ranger uniforms. It -- he's  
13 waving his hand in the dark over there. So if you'd  
14 like to talk to him, his name is Justin Berndt,  
15 afterwards. I'm sure he can help you out.  
16 I see a hand go up in the back.  
17 MS. WOOD: Hi, my name is Sharon Wood.  
18 I'm a teacher at Marcus High School. My question is,  
19 along with the seepage and some of the other problems  
20 that -- the issues that you're looking at in the dam,  
21 how much of a concern is the buildup of the sediment on  
22 the lakeside as we get, you know, floods coming in and  
23 dropping off sediment up against the dam?  
24 Because one of the things I've read is  
25 that that can -- that can be a problem for the dam. So

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1 I was wondering if that's also a contributing factor  
2 into some of the issues that you're having with the dam?  
3 MS. BRANCH: Actually, the sediment  
4 would -- would in all probability actually reduce the  
5 issues associated with the seepage, because those are  
6 very, very fine grain materials and it's much, much  
7 harder for water to move through that. So -- so we do  
8 have some sedimentation occurring.  
9 We have -- we go out and periodically do  
10 surveys, and we show that in some areas we've got close  
11 to four, five feet of sediment that's actually come in.  
12 But, again, no, we don't think that has been a concern  
13 for us with respect to the problems for the performance  
14 of the dam itself.  
15 MR. DAVIS: Hi, Jim Davis, Lewisville.  
16 Could you touch again on the pool level you discussed  
17 earlier, not letting the level rise during flood season?  
18 And what level the flood -- floodplain is today? I  
19 think you mentioned if there was a lot of water you  
20 would not go above the current pool level.  
21 MS. BRANCH: No, I -- if I said that, I'm  
22 so sorry, because that would not have been the intent.  
23 You know, this dam is here for -- for flood risk  
24 management.  
25 What I was trying to say, and I'll try

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1 and clarify it a little bit better here, is that if we  
2 need to as the pool rises and we get into flood  
3 conditions, if we need to, I think before we were  
4 authorized to discharge at 4,000 cubic feet a second to  
5 help us handle that flood water loading that comes in.  
6 So because we do have these concerns, one  
7 of the things we wanted to do is if we need to, as the  
8 flood water is coming up, we want to be able to get it  
9 out behind the dam as quickly as possible. Again, if we  
10 need to.  
11 If we see signs of distress, you know,  
12 when that pool water comes up, we're actually out there  
13 inspecting it several times a day, so we're watching the  
14 dam. So we did get -- we have permission to actually go  
15 in and increase those discharges from 4,000 to 5,000  
16 CFS, and because of that, we'll be able to get water  
17 from out -- out from behind the dam quicker. But, no,  
18 we don't have any plans to restrict any pools at all  
19 whatsoever.  
20 MR. DAVIS: Okay. Another question,  
21 today is -- today is there any kind of early warning  
22 system for downstream?  
23 MS. BRANCH: Jason, can I ask you to help  
24 me with that question? This is Jason Vazquez, and he is  
25 the Dam Safety Program Manager for the Fort Worth

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1 District Army Corp of Engineers. And he's got 25 dams  
2 that he's responsible for, so he can address that one.  
3 MR. VAZQUEZ: That's a great question.  
4 Actually, one of the interim risk reduction measures was  
5 to study the potential for a downstream notification  
6 system. What we found out is a lot of the downstream  
7 cities are already -- they have standing systems in  
8 place.  
9 So right now what we're working with  
10 instead of trying to reinvent the wheel and have our own  
11 alert system, we're working with the downstream agencies  
12 to tie into theirs, and that way make efficient use of  
13 their systems in place but get them the information  
14 they'll need to make actions during a flood situation.  
15 MS. BRANCH: Thank you, Jason.  
16 MS. WOOD: I think he might need to come  
17 up here again, because my questions all go towards that.  
18 I am interested in whether or not we had an emergency  
19 action plan in place seeing the risk that we're under  
20 with the high population and stuff. But I went and  
21 pulled some fact sheets, and as of 2008, we had 23 dams  
22 in Texas that failed.  
23 Of those, how many were in a high  
24 populated area, and were there -- were they on your  
25 list? Did you have all these interim measures in place

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1 for any of them? I mean, you say we shouldn't be  
2 worried, but 2008 to March of 2012, 23 failed.  
3 MR. VAZQUEZ: Okay. I'm going to try to  
4 do my best with this. First thing to understand is the  
5 Corp of Engineers owns and operates about 25 dams in the  
6 Fort Worth District, and those are the dams that we are  
7 concerned with.  
8 And those are not the dams that were  
9 listed in the study that you provided. None of our dams  
10 have failed ever that -- so that -- that's the answer to  
11 that question is, the 25 dams that we were responsible  
12 for, that's not part of that study.  
13 To answer your question on the emergency  
14 action plans, yes, we do currently have an active  
15 emergency action plan. All specific information to the  
16 downstream resource or downstream agencies, emergency  
17 management agencies, and available resources for flood  
18 fighting are updated annually.  
19 And as part of the risk management  
20 process that the Corp is doing now, emergency exercises  
21 have been instituted, and the frequency of those  
22 exercises is raised for the -- based on risk.  
23 So with Lewisville, we will be having  
24 some kind of coordination with downstream stakeholders.  
25 We're going to try to do that annually, and we will have

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1 some kind of exercise every two years. And we did our  
2 first one last year in actually September 11th of 2012,  
3 almost exactly a year ago.  
4 And we had more than 19 downstream cities  
5 participate in that, and that was a great exercise to  
6 get this information to the downstream agencies and let  
7 them know what was -- what the potential consequences  
8 are with our structure.  
9 So we are implementing that coordination  
10 as part of our interim risk reduction measure, because  
11 that is -- actually, it's what we like to refer to as  
12 low hanging fruit, because that's easy stuff that we can  
13 do right away. It's not that hard to coordinate with  
14 people, so we -- we've really increased our  
15 coordination.  
16 MS. WOOD: Okay. On the facts for  
17 Lewisville Lake dam that y'all put out on the City's  
18 website, it talked about as far as getting flood  
19 insurance, those of us that may be in the path of this  
20 should something happen. Where can we find a map that  
21 we don't have to guesstimate where our house is if that  
22 has the dam failure inundation area on it so we know  
23 where we sit in that particular area?  
24 MR. VAZQUEZ: That is a very good  
25 question. There's actually a lot of talk about that

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1 information right now, and a lot of policy makers are  
2 having kind of up-and-down decision weighing the pros  
3 and cons of releasing that information readily to  
4 everyone, because it could show our vulnerabilities.  
5 The best I can tell you right now is, if  
6 you contact the Corp directly and you tell us where your  
7 property is and what your need for this information is,  
8 we can get you that information for your property on a  
9 direct request basis. And other than that, limited  
10 information will be made available to the downstream  
11 agencies that could be shared with the public.  
12 Like I said, I'm going to have to leave  
13 it at that right now, because there's a lot of policy  
14 makers trying to decide what information is able to be  
15 released and what information is not.  
16 MS. WOOD: Well, I understand politics,  
17 but I need to know who to call, because I would like to  
18 know where my house sits. So if I need to call somebody  
19 directly, what number is that?  
20 MR. VAZQUEZ: You contact the public  
21 affairs office, and they can direct that inquiry to the  
22 proper person and get you that information.  
23 MS. HUNTER: And if you want to e-mail  
24 me, I can point you in the right direction, too.  
25 MS. WOOD: Okay.

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1 (Discussion off microphone.)  
2 MS. FAGERHOLM: Do we have any more  
3 questions or comments?  
4 MS. MENARD: Hi, my name is Karen Menard.  
5 I work for the Upper Trinity Regional Water District in  
6 Lewisville, and we are a major stakeholder from a water  
7 supply standpoint. Your map that you showed earlier,  
8 you talked about the City of Denton and the City of  
9 Lewisville.  
10 We actually supply the water to that --  
11 to the City of Lewisville as well as 25 other cities in  
12 this area. I wanted to mention we currently have a  
13 60-inch water supply line that goes from the intake at  
14 the dam to our water plant.  
15 Part of our plans for future growth  
16 include two parallel 84-inch lines to get us from 70  
17 million gallons a day to 300 million gallons a day. So  
18 the intake structure on the dam is not the ultimate  
19 facility, and plans are in place for additional future  
20 growth.  
21 The District respectfully requests that  
22 its needs be considered as a stand-alone entity since it  
23 is ultimately responsible for the water needs of several  
24 cities in the surrounding area.  
25 We also request that cumulative impacts

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1 be considered as they relate to future maintenance and  
2 projects such as fiberoptics. And any kind of water  
3 quality impacts that may effect the water quality in the  
4 lake would be things such a turbidity, that kind of  
5 thing, please consider that, as well. That's all I  
6 have.

7 MS. FAGERHOLM: Okay. Your comments have  
8 been noted for the record, and we will be following up  
9 with our water partners as the need arises. Thank you  
10 very much.

11 MR. BACCHUS: Yes, ma'am. My name is  
12 Steve Bacchus. I'm with the City of Lewisville, and to  
13 complement the young lady from Upper Trinity, we also  
14 have basically an intake structure owned and operated by  
15 the City of Lewisville and also participate in part  
16 ownership of the Upper Trinity Regional Water District,  
17 and we'd also like to have that information as she also  
18 requested.

19 MS. FAGERHOLM: Yes, sir. That is noted  
20 for our record. Thank you.

21 I think we have a hand in the back.

22 MS. WOOLWORTH: Hi, my name is Paula  
23 Woolworth.

24 MS. FAGERHOLM: Just one second.

25 THE REPORTER: I'm sorry?

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1 MS. FAGERHOLM: Just one second.

2 MS. WOOLWORTH: Hi, my name is Paula  
3 Woolworth. And the question I have -- I'm very well  
4 aware we're talking about Lewisville, but since you're  
5 talking about the conservation pool and its capacity to,  
6 you know, be maintained and the fact that if this study  
7 may result in some work that is 2017 to 2018 completed,  
8 that's a number of years between now and then.

9 And so if the -- perhaps a condition  
10 might arise like it did in 2007 when we had a  
11 significant amount of rain, and I know the lake came  
12 into my backyard.

13 I also live above the dam, though, and so  
14 I'm wondering what, if anything, is being done like this  
15 relative to Lake Ray Roberts, and is its flow being  
16 controlled into Lake Lewisville so that the conservation  
17 pool doesn't get taxed?

18 MR. VAZQUEZ: To answer your first  
19 question, yes, the -- the risks at Ray Roberts are --  
20 I'm sorry, that's probably your last question, but I'm  
21 going to work backwards.

22 The risks at Ray Roberts are being  
23 addressed. It is currently a high-to-moderate risk  
24 structure. So the releases are being manage -- we are  
25 managing the path between Ray Roberts and Lewisville in

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1 the best way we can as far as the risks. It's a hard  
2 question to answer.

3 But the other question or your first  
4 question regarding the water backing up in 2007, all I  
5 can really say to that is, for this particular study,  
6 the majority of our consequences being considered are  
7 for the downstream area. And so the area upstream of  
8 the dam does get considered as part of the study but not  
9 as much. Did that answer your question?

10 MS. WOOLWORTH: Mostly.

11 MR. VAZQUEZ: That's good. I'm sorry.

12 THE REPORTER: Could you spell your last  
13 name for me, ma'am?

14 MS. WOOLWORTH: Woolworth,  
15 W-O-O-L-W-O-R-T-H.

16 THE REPORTER: I appreciate it. Thank  
17 you.

18 MR. VAZQUEZ: And just to follow up on  
19 that, that right now the study is for Lewisville.  
20 Because as Anita pointed out earlier, the prioritization  
21 is to address the worst first, and so Lewisville is  
22 worse than Ray Roberts. But we will continue and we are  
23 always continuing our routine O&M and implementing our  
24 interim risk reduction measures, so.

25 MS. WOOLWORTH: Thank you.

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1 MS. BRANCH: Yeah, as Jason said, we're  
2 implementing interim risk reduction measures. You saw  
3 the list of the ones we've done at Lewisville. Well,  
4 Lewisville is only one of the 25 projects that we've  
5 looked at, and we've also implemented interim risk  
6 reduction measures where the risk was not as low as we  
7 wanted it to be at other projects, as well.

8 MS. FAGERHOLM: All right. Does anyone  
9 else have any more comments or questions? One hand in  
10 the back.

11 MS. WOOD: I just want to put my request  
12 also to the Corp that they release the information as  
13 far as flood risk for Lewisville so that homeowners can  
14 make an informed decision as to the amount or whether or  
15 not they need flood insurance and what their actual risk  
16 is. I think to keep that private is doing a disservice  
17 to the community.

18 THE REPORTER: Could you please identify  
19 yourself, ma'am? I'm sorry.

20 MS. WOOD: I'm sorry. Sharon Wood.

21 THE REPORTER: Okay. Thank you. I  
22 appreciate it.

23 MS. FAGERHOLM: Thank you. Thank you,  
24 Sharon, your comment has been noted.

25 Any more? And, again, we're accepting

1 comments throughout the study process, but comments  
2 within the next 30 days are the most helpful to us. So  
3 please contact Ms. Hollie Hunter.

4 And, again, these slides will be on the  
5 internet page for your use at approximately 9:00 p.m.

6 Ms. Vicki, did you need any more  
7 clarifications?

8 THE REPORTER: No, I think everybody  
9 spelled for me.

10 MS. FAGERHOLM: Okay.

11 THE REPORTER: Thank you. I appreciate  
12 it.

13 MS. FAGERHOLM: Yes, ma'am. Well, this  
14 concludes our presentation. Thank you so much for your  
15 input.

16 (Meeting adjourned at 7:59 p.m.)  
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1 STATE OF TEXAS )  
2 COUNTY OF DENTON )  
3

4 I, Vicki L. Smith, Certified Shorthand  
5 Reporter in and for the State of Texas, hereby certify  
6 that the foregoing pages numbered 1 through 18  
7 constitute a full, true and accurate transcription of my  
8 stenographic notes of the proceedings held on August  
9 20th, 2013, in the above-referenced matter.

10 Signed this 30th of August, 2013.  
11

12   
13



14  
15 VICKI L. SMITH, Texas CSR #8061  
Expiration Date: 12/31/13  
Merit Court Reporters  
16 Firm Registration No. 133  
307 West 7th Street  
17 Suite 1350  
Fort Worth, Texas 76102  
18 (817) 654-4006 (Office)  
(817) 335-1203 (Fax)  
19  
20  
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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](mailto:marcia.r.hackett@usace.army.mil).

A handwritten signature in black ink, appearing to read "Eric W. Verwers".

Eric W. Verwers  
Director, Regional Planning and  
Environmental Center

**HEALTHCARE** | **HEALTHCARE** | **HEALTHCARE**

**ADOPTIONS**

Cardiovascular Specialists, P.A. is seeking outstanding nurse practitioners to participate in all aspects of both office and hospital patient care. The successful candidates will possess sound clinical decision making and have great communication skills. Excellent compensation based upon experience. Benefit package includes great working atmosphere, 401k and profit sharing, generous CME and vacation packages. Please fax resume to: 972-874-2950.

**ADOPTION:** Children's Book Author (will be stay-Home Parent) & Attorney year for 1st baby. Expenses paid. 1-800-844-1670 Barb & Matt

**972-422-SELL**

**GENERAL** | **GENERAL** | **GENERAL** | **GENERAL**

**ENTRY LEVEL MANUFACTURING JOBS OPEN NOW IN DALLAS**

Volt Workforce Solutions may have the opportunity for you. We are teaming with the largest semiconductor company in Texas and your experience in manufacturing, fast food or the retail industry could transfer easily to our client. As a **Manufacturing Specialist**, you will provide support to the operation of machinery used in the wafer fabrication process which is performed in a clean room facility located in **Dallas**.

**Career path into a large professional corporate environment**

- Stable full-time hours. facility operates 24 hours/day, 365 days/year
- Each shift is 12 hours in length (OT pay after 8 hours worked each day)
- In-depth training/certification for unique in-demand skills
- Shifts range from 7AM - 7PM or 7PM - 7AM (compressed shifts - will work 3 to 4 days/week alternating)
- 3-4 days off per week
- Clean room environment, requires full smoking including face masks and goggles
- Retention Bonus (During first year)

**REQUIREMENTS**

- High school degree or equivalent
- A stable and steady work history with at least one year of work experience
- Excellent previous work references from past supervisors
- Good communication skills and hands-on learner
- Previous experience standing on your feet for extended periods of time
- Able to work days, nights or weekends
- Basic computer operating skills
- Ability to work in a confined area (clean room) and comfortable with full body smock
- Our client requires pre-employment background and drug screenings

**VOLT Workforce Solutions**

**Volt Workforce Solutions Job Fair:**  
**Wednesday, Nov. 4th**  
**1 pm - 4 pm**  
**Baylor Health & Occupational Bldg.**  
*(across the street from the TI Campus)*  
**13350 TI Blvd., Dallas, TX 75243**  
**972.731.8393**

**SALES & MARKETING** | **SALES & MARKETING** | **SALES & MARKETING**

**STAR CLASSIFIEDS**  
**972-422-SELL**

**BUSINESS DEVELOPMENT**

StarLocal Media is looking for digital savvy, highly motivated sales professionals to join our advertising team, selling our marketing solutions to local small businesses.

**JOB DUTIES**

- Territory management including generating new leads, managing active accounts, calling on inactive accounts, and actively monitoring new business openings
- Understanding clients advertising needs, developing and managing effective long-term marketing programs
- Delivering customized sales presentations in person
- Attending weekly sales meetings as required
- Achieving your individual monthly sales quota

**WHAT DO WE OFFER**

- Base salary PLUS aggressive monthly commissions
- Comprehensive Medical, Dental & Vision coverage
- 401(k) Savings Plan
- Paid Time Off
- Paid Company Holidays

EMAIL RESUME TO [HR@STARLOCALMEDIA.COM](mailto:HR@STARLOCALMEDIA.COM)

**SELL YOUR CAR**

972.422.7355 StarLocalClassifieds.com

**ANNOUNCEMENTS**

**ADOPTIONS**

St. Marin Apartments Community Sale - Sat., 11/7, 11/6, 11/5, 11/4, 11/3, 11/2, 11/1. Music & food 1717 E. Bell Street, Coppell, TX 75019

**LEWISVILLE**

**HUGE Garage Sale:** Fri., 11/6, Sat., 11/7, 11/8, Sun., 11/9. New & like-new items, clothes, home furnishing & MUCH MORE! 250 Legends Drive, Lewisville (old town Lewisville on corner of Keady & Legends)

**LEWISVILLE**

**DATE CHANGED!!** St. Philips Garage Sale 1897 W. Main Street in back parking lot SAT, NOV. 14th 7a-2p

**LEWISVILLE**

**Under 1/4-Acre** on Lake Fork. Low Down, Low Monthly Payment. \$91 per month. 903-878-7265

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**OUT OF TOWN PROPERTY** | **AUCTIONS** | **AUCTIONS**

**ANTIQUE AUCTION**  
**SUNDAY NOVEMBER 8, 2015 AT 1:00 PM**  
**THE GAINSVILLE OUTLET SHOPS**  
**SUITE 180**  
**4521 N. INTERSTATE 35**  
**GAINSVILLE, TX 76640**  
**www.miearsauction.com 405-627-1767**  
**H.A. Miears TX LIC#6242**  
 10% buyer's premium

**SELLING AT AUCTION OVER 300 LOTS OF ANTIQUE FURNITURE, COLLECTIBLES, CLOCKS, ART GLASS WINDOWS, BRONZE STATUARY, ANTIQUE OILS, RUGS, ART WORK, ANTIQUE GLASS, EARLY COLLECTIBLE GOLD AND SILVER COINS, EARLY PAPER CURRENCY INCLUDING \$300.00 BILL, CYLINDER ROLL MUSIC BOX, DISC MUSIC BOX, ES-TATE JEWELRY INCLUDING 2 CARET LADIES DIAMOND RING. MOST OF THIS MERCHANTISE HAS BEEN IN STORAGE.**

**Make Plans Early to attend.**  
**Terms Cash or check with Proper ID**  
**announcements made day of sale**  
**supersedes all other advertisement.**

**47 ac.** **Clarksville, TX** fronts hwy 82 and rails for trails \$128,750 will fin. text/call 972-567-5249

**MERCHANDISE**

**FURNITURE**

Office furniture, two printers, desk chair \$350.00 FOR ALL. 214-796-5714

**ELMCROFT SENIOR LIVING**

1201 N. CENTRAL #3 at 15th, SW Corner behind Einstein Bros. Bagels & Office Max. 972-423-2205 KingArthurClock.com

**CEMETERY PLOTS / MAINTENANCE**

Ridgeway Memorial Plot 3000 Gardens of Resurrection 214-850-9706

**WANT TO BUY**

Collector Wants to Buy Old Fishing Tackle 214-850-9706

**DRIVERS**

Drivers: Great Home Time. Competitive Pay. Benefits include Medical, Dental & Vision coverage. Tuition reimbursement. Long term employment. CDL. 855-971-9784

**DRIVERS**

www.dannyherman.com lella.brown@dannyherman.com 800-331-3725 915-892-4667

**Need Employees?**

STAR CLASSIFIEDS 972-578-WORK

**DRIVERS**

**CAREWORK SUPERVISOR POSITION**  
 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.caadenton.org) or by mail to CASH of Denton County, 614 N. Bell Avenue, Denton, TX 76209.

**DRIVERS**

**Need Employees?**

STAR CLASSIFIEDS 972-578-WORK

**DRIVERS**

**Need Employees?**

STAR CLASSIFIEDS 972-578-WORK

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**Need Employees?**

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### Current Ad Listings

#### NOTICE OF PUBLIC MEETING ENVIRONMENTAL IMPACT STATEMENT

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](mailto:marcia.r.hackett@usace.army.mil).

Appeared in: *The Dallas Morning News* on Sunday, 11/08/2015

Attachment 1  
No Attachment Uploaded



Attachment 2  
No Attachment Uploaded



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**Portable Buildings**



**WOOD BUILDINGS**  
(Unfinished Inside)

|       |          |
|-------|----------|
| 12x16 | \$2,295  |
| 14x24 | \$4,195  |
| 16x32 | \$4,795  |
| 24x28 | \$7,895  |
| 30x40 | \$13,500 |

(built on site) 214-557-6415

**Tickets - Sports/Entertainment**

**COWBOY TICKETS FOR SALE:** All home and away games, various seat locations all priced fairly. Call (205) 413-6867 or email: globalpeachtree@gmail.com

Buying! Cowboys Seat options & Suite leases for all DFW teams, email robert.smith@southdoutsports.com

**DISCOUNT AIRFARE**  
WE BUY MILES / VIP'S  
972-262-2218

**Wearing Apparel**

**DALLAS DESIGN DISTRICT**  
Bijou Luxury Consignment  
★ Shop Partners Card  
10/30-11/8 addl 20% off  
1430 Dragon St. Unit 3 - 11a-6p.  
**(214) 760-1610**  
Women's high end clothes, shoes, bags, accessories, Celebrity wardrobe, Louis Vuitton, Chanel, Hermes, Christian Louboutin, Jimmy Choo, Gucci, Prada & more!

**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 of 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 MWBE 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 to 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 MWBE (DBE) participation at all tiers. In furtherance of this policy, MBJ3 has implemented an MWBE (DBE) Program for all bidders in which they are required to demonstrate good faith efforts to obtain maximum practical MWBE (DBE) participation and to contractually commit to a percentage of MWBE (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 MWBE's (DBE) at the recommended minimum goal levels listed above. You may contact Ricardo Cardoza at 214-438-6870 for a list of MWBE (DBE) contractors in the DFW area that may be interested in this project.

Subcontracting opportunities include subcontract labor and MWBE, 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](http://www.cityofkeller.com).

Contact Information:  
Keith Fisher, P.E.,  
Director of Public Works,  
817-743-4081 or  
kfisher@clyofkeller.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**

**Bids & Proposals**

contact Matt Barker of Manhattan for access to plans and specifications as well as general questions. 214-387-7400 (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](mailto: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

**Bids & Proposals**

**Legal Notices**

Increase the allowable lot coverage from 45% to 54% by Vorkey Jose at property commonly known as 914 Mesquite Flower Ln (BA File 15-14).

**MISC**  
1. In accordance with Article VIII Section 1 of the amended version of the Rules of Procedures: 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. Aranda 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 1900 Anita Street. (File P 15-30) (District 5).

CPN 6537 Pub. 11/08/2015

**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.

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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. Plinkston High School in order to create a School-Based Health Center to serve the population. The address of the property is 2200 Dennis 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 at 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 KATX Telemundo 39 de lunes a viernes en el noticiero de las 9 y 10 p.m.

http://www.telemundodallas.com/eltiempo



### Sábado



Muy Nublado  
Máx.: 64  
Mín.: 46

### Domingo



Parcialmente nublado  
Máx.: 62  
Mín.: 48

### Lunes



Parcialmente nublado  
Máx.: 66  
Mín.: 56

### Martes



Muy Nublado  
Máx.: 74  
Mín.: 62

### Miércoles



Tormenta  
Máx.: 67  
Mín.: 51

## GUÍA DE LA COMUNIDAD

**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, 946I LBJ Freeway, Suite 100, Dallas. El costo de inscripción es de \$40. Información: Luis Arango 214-634-782

**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, comité gratis, mariachis y rifas. Sábado 7 de noviembre de 10 a.m. a 1 p.m. en el Centro de Recreación Jaycee Zaragoza, 314 Cymmer, Dallas. Información: Sargento Roberto Muñoz 214-789-9660 Centro de Recreación Jaycee Zaragoza 214-670-6888

**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 viernes 20 de noviembre a las 5:30 p.m. en la Escuela primaria D. McRae Corazon de María, 3316 Avenue N., Fort



DAVID WOODMAN

Caridades Católicas de Dallas tendrá un taller sobre ciudadanía.

work. 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.proyecto migrante.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 Envy 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/mexitell/ 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. Borham 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 Academy, 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. Huly 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

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 compañías 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: 562-963-9042 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, 155 Young St., Dallas. Para registrarse llame a Ron Session 214-266-0650 o mande un correo electrónico a Ronald.Session@hhs.org Información: 214-266-0650

### Contratando persona para coser de mano y maquina.

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### FOWLER CHRISTIAN APARTMENTS

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105 Juliette Fowler Street, Dallas, TX 75214  
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Heraldo DE LA FEERÍA CRISTIANA

### 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.

### al dia

Editor en Jefe  
Alfredo Carbajal  
acarabajal@aldiadallas.com

Gerente General de Ventas  
Homero Martinez  
hmartinez@dmmedia.com

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 stopdial@aldiadallas.com

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Edición de hoy  
Vol. 13 No. 12, 3 secciones

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### 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. Marsha Hackett, U.S. Army Corps of Engineers, C&SWF-PEC-TA, P.O. Box 17300, Room 3412, Fort Worth, Texas 76102-0300 o por correo electrónico a marsha.hackett@usace.army.mil.

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-PEG-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](mailto: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](http://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<sup>1</sup> 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),<sup>2</sup> and Labor (DOL), the Corporation for National and Community Service (CNCS), and the Institute for Museum and Library Services (IMLS).<sup>3</sup> Further, applicants are

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> 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.

**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](mailto: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](mailto: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](http://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](http://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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## 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 associated 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

Valley Ranch Library  
401 Cimarron Trail  
Irving, Texas 75063

North Oak Cliff Branch Library  
302 West Tenth Street  
Dallas, Texas 75208

Coppell Public Library  
500 Southwestern Boulevard  
Coppell, Texas 75019

J. Erik Jonsson Central Library  
1515 Young Street  
Dallas, Texas 75201

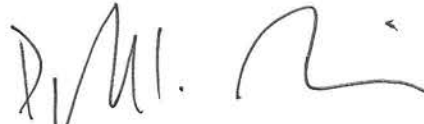
Dallas West Branch Library  
2332 Singleton Boulevard  
Dallas, Texas 75212

Farmers Branch Manske Library  
13614 Webb Chapel Road  
Farmers Branch, Texas 75234

Oak Lawn Branch Library  
4100 Cedar Spring Road  
Dallas, Texas 75219

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](mailto:marcia.r.hackett@usace.army.mil). Written comments may also be submitted at the public meeting.

A handwritten signature in black ink, appearing to read 'D. Sims', with a stylized flourish at the end.

Douglas Sims, RPA  
Chief, Environmental Compliance Branch



US Army Corps  
of Engineers®  
Fort Worth District

# Lewisville Lake Dam Safety Modification Study

## Public Information Meeting

### September 27, 2016

I have the following comments as input for an Environmental Assessment concerning dam safety modifications at the Lewisville Lake Dam.

I am the President of Denton County Transportation Authority. My principal concern is the release levels from the lake. This impacts our rail line downstream of Lewisville Lake. During the completion of this work, I am concerned that the ~~work~~ work may increase the occurrences of high flows ( $\pm 15,000$  cfs). Decisions regarding the improvements and the construction specs. need to take this into ~~acc~~ account. Indian Creek flows impact us as well.

Name \_\_\_\_\_

Address \_\_\_\_\_

Phone Number (optional) \_\_\_\_\_

Email Address (optional) \_\_\_\_\_

Complete this form and return it tonight by placing it in the comment box, or mailing it to Ms. Marcia Hackett, CESWF-PEC-TN, U.S. Army Corps of Engineers, Fort Worth District, P.O. Box 17300, Fort Worth, TX 76102-0300, or emailing the information to [Marcia.R.Hackett@usace.army.mil](mailto:Marcia.R.Hackett@usace.army.mil).

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**Sent:** Saturday, October 8, 2016 10:52 PM  
**To:** Hackett, Marcia R SWF  
**Subject:** [EXTERNAL] Lewisville Lake Dam Public Comments

This last summer releases from the Lewisville Lake Dam to lower the lake level were made to maintain a level of 8ft at the Sandy Lake Rd. measuring station on the Elm Fork of the Trinity River. The 8ft river level caused water to back up through fairway drains at the Carrollton Indian Creek golf course and flood low lying areas of some Creek Course fairways. The resulting flooding required the Creek Course to be closed for several weeks during the summer of 2016.

The "Action Level" at the Sandy Lake Rd. measuring station is 7ft. If the Corps of Engineers would limit the flow rate to maintain the river at the "Action Level" of 7ft, the fairway flooding would be significantly reduced. Please advise if this can be implemented.

Thank you,  
Al Overholt

[REDACTED]

## **Appendix B**

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### *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](mailto:dueckert@cityoflewisville.com)  
972-219-3404

---

REVIEWER:

*Mayra G. Diaz*  
Floodplain Management and Insurance Branch  
Mitigation Division  
(940) 898-5541

DATE: August 6, 2013



REPLY TO  
ATTENTION OF

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

RECEIVED FWS MFL RY 21  
FEMA, REGION VI

2013 AUG -2 P 3: 23

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](mailto:hollie.hunter@usace.army.mil). Thank you for your interest and cooperation.

Sincerely,



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 <sup>boom</sup> ~~line~~. 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  
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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 "Revised Alternatives" 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.



Life's better outside.®

January 10, 2014

Ms. Hollie Hunter  
CESWF-PER-E  
U.S. Army Corps of Engineers  
P.O. Box 17300  
Fort Worth, TX 76102-0300

Commissioners

T. Dan Friedkin  
Chairman  
Houston

Ralph H. Duggins  
Vice-Chairman  
Fort Worth

Antonio Falcon, M.D.  
Rio Grande City

Dan Allen Hughes, Jr.  
Beeville

Bill Jones  
Austin

James H. Lee  
Houston

Margaret Martin  
Boerne

S. Reed Morian  
Houston

Dick Scott  
Wimberley

Lee M. Bass  
Chairman-Emeritus  
Fort Worth

---

Carter P. Smith  
Executive Director

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](mailto: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](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/enviroconcerns/kills\\_and\\_spills/region/s/](http://www.tpwd.state.tx.us/landwater/water/enviroconcerns/kills_and_spills/region/s/).

The TPWD Annotated County Lists of Rare Species are available at [http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered\\_species/](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](mailto: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 SGCN 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/](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 sirtalis 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



Hollie Hunter  
Page 5  
January 10, 2014

species, SGCN, or other rare resources to  
[TexasNatural.DiversityDatabase@tpwd.texas.gov](mailto: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](mailto:Karen.Hardin@tpwd.texas.gov).

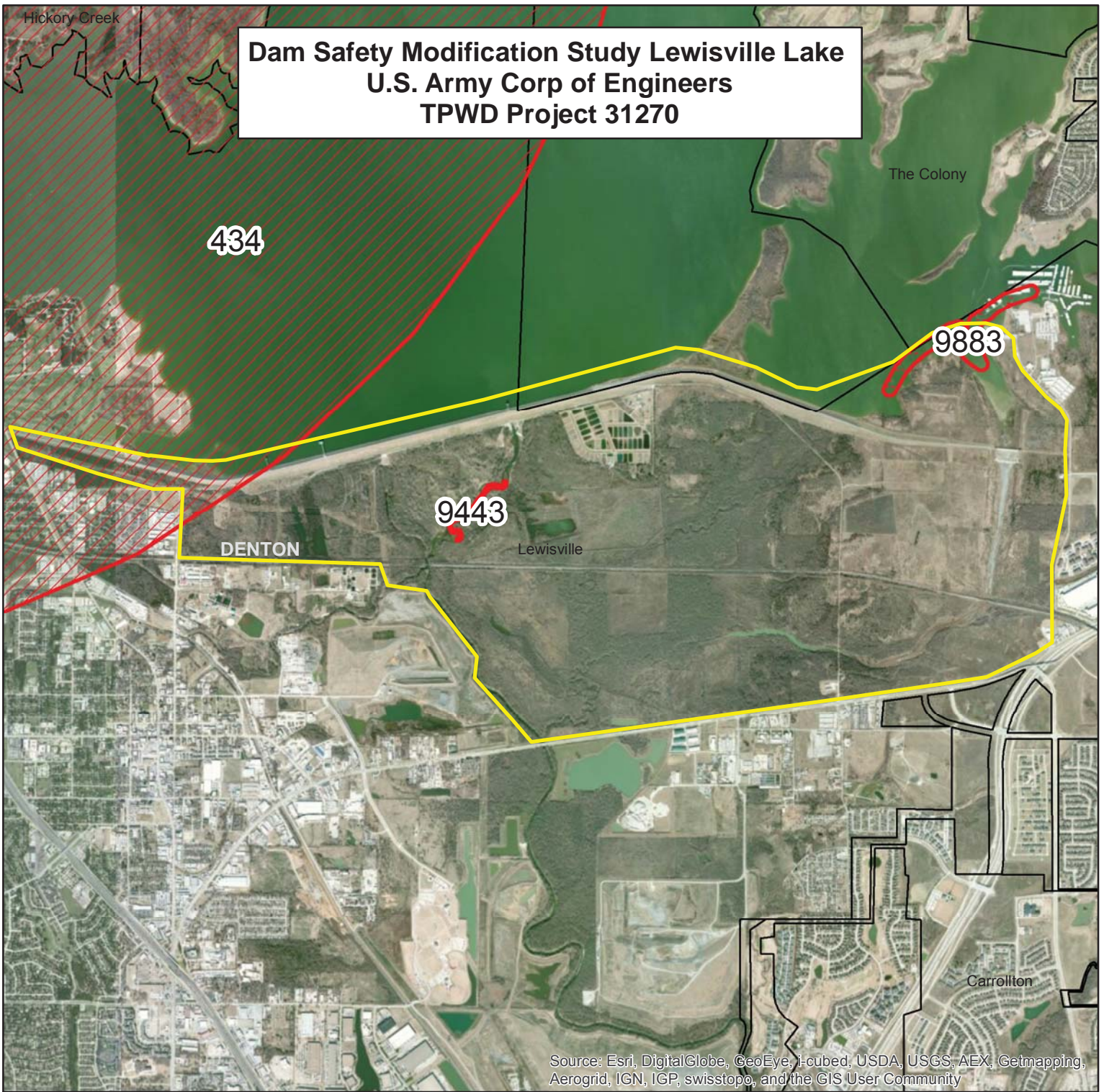
Sincerely,



Karen B. Hardin  
Wildlife Habitat Assessment Program  
Wildlife Division

kbh/31270

Attachment



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](mailto: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

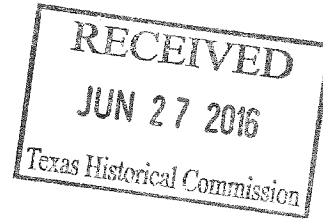
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DEPARTMENT OF THE ARMY  
FORT WORTH DISTRICT, CORPS OF ENGINEERS  
P. O. BOX 17300  
FORT WORTH, TEXAS 76102-0300

June 23, 2016

Mark Wolfe  
Executive Director  
Texas Historical Commission  
1511 Colorado St.  
Austin, TX 78701



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](mailto:joseph.s.murphey@usace.army.mil).

Douglas Sims, RPA  
Chief, Environmental Compliance Branch

CONCUR  
by William A. Mait  
for Mark Wolfe  
State Historic Preservation Officer  
Date 7/7/16  
Track# Enclosure



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

|  |                                     |
|--|-------------------------------------|
| <b>NO HISTORIC<br/>PROPERTIES AFFECTED<br/>PROJECT MAY PROCEED</b> |                                     |
| by   |                                     |
| for  | Mark Wolfe                          |
|  | State Historic Preservation Officer |
| Date   | 7/27/16                             |
| Task#  | 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.

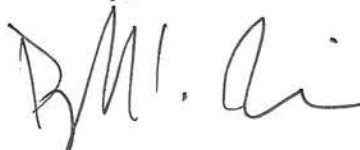
The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address identified deficiencies. Under the proposed action, the USACE 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 associated 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,

A handwritten signature in black ink, appearing to read "D. Sims". The signature is fluid and cursive, with a large initial "D" and a long, sweeping underline.

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.

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 associated 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 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,

A handwritten signature in black ink, appearing to read "D. Sims". The signature is written in a cursive style with a large initial "D" and a long, sweeping tail.

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.

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.

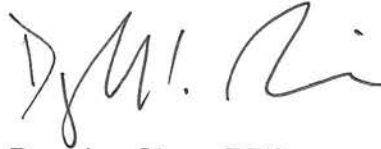
The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address identified deficiencies. Under the proposed action, the USACE 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 associated 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.

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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 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,

A handwritten signature in black ink, appearing to read "D. Sims". The signature is fluid and cursive, with a large initial "D" and a stylized "S".

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.

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 associated 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.

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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,

A handwritten signature in black ink, appearing to read "D. Sims", with a stylized flourish at the end.

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.

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.

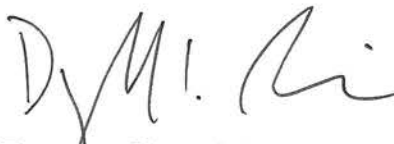
The Lewisville Dam is currently functioning as designed, and the probability of failure is remote. While failure is a remote probability, the risk to human life and property should failure occur is high enough to warrant action to address identified deficiencies. Under the proposed action, the USACE 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 associated 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 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,

A handwritten signature in black ink, appearing to read "D. Sims". The signature is fluid and cursive, with a large initial "D" and a stylized "Sims".

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.

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 associated 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.

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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,

A handwritten signature in black ink, appearing to read "D. Sims". The signature is fluid and cursive, with a large initial "D" and a stylized "S".

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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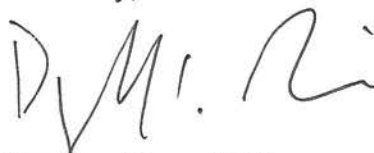
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are enclosed with this communication for your review and to solicit any comments or concerns the Water Quality Division of the Texas Commission on Environmental Quality may have regarding this action. We will consider any comments that we receive from 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,

A handwritten signature in black ink, appearing to read "D. Sims", written in a cursive style.

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,

A handwritten signature in black ink, appearing to read "D. Sims", with a stylized flourish at the end.

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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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 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,

A handwritten signature in black ink, appearing to read 'D. Sims', written in a cursive style.

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,

A handwritten signature in black ink, appearing to read 'D. Sims', with a stylized flourish at the end.

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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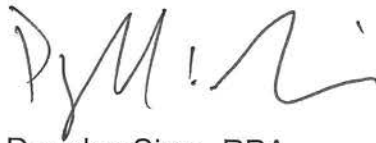
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are enclosed with this communication for your review and to solicit any comments or concerns the U.S. Fish and Wildlife Service may have regarding this action. We will consider any comments that we receive from your office by the close of the comment 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,

A handwritten signature in black ink, appearing to read 'D. Sims', with a stylized flourish at the end.

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.

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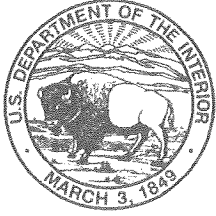
A Notice of Availability (NOA) has been prepared to notify the public of this action and to solicit comments on the EA and draft FONSI. The NOA and EA with draft FONSI

are enclosed with this communication for your review and to solicit any comments or concerns the 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,

A handwritten signature in black ink, appearing to read 'D. Sims', with a stylized flourish at the end.

Douglas Sims, RPA  
Chief, Environmental Compliance Branch



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
2005 NE Green Oaks Blvd., Suite 140  
Arlington, Texas 76006

In Reply Refer To:  
02ETAR00-2011-I-0109

October 12, 2016

Mr. 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

Dear Mr. Sims,

Thank you for your letter of September 16, 2016, and the accompanying Environmental Assessment (EA) for the proposed Dam Safety Modifications for Lewisville Dam on the Elm Fork of the Trinity River, in Lewisville, Texas. The U.S. Army Corps of Engineers (USACE) has issued a Finding of No Significant Impact for the project and is requesting comments from the Fish and Wildlife Service. Our comments are offered in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544) (Act), the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and the National Environmental Policy Act (NEPA) of 1969, as amended.

The purpose of the proposed action is to minimize the potential for dam failure, by remediating the seepage deficiencies, decreasing spill weir instability and potential apron failure at the Lewisville Dam, for safe and effective functioning at authorized capacity, while reducing the risk to the downstream public. The USACE would reduce risk of dam failure from seepage deficiencies at two locations by constructing downstream inverted filter berms with collection trenches for seepage flow at each location. The USACE would also reduce risk of dam failure associated with spillway instability by constructing post-tension 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 construction activities associated with the proposed action would be conducted on Lewisville Lake Federal project lands.

The Service began preliminary fieldwork for this project in 2010 and provided an Existing Conditions Planning Aid Letter in June of 2011. At the request of the USACE, the Service and the USACE conducted additional fieldwork cooperatively in 2014 and a Supplemental Existing

Conditions Planning Aid Letter was provided in June of 2014. As indicated with our prior Planning Aid Letters, we continue to support the conclusion that the proposed actions “may affect, but are not likely to adversely affect” the interior least tern. Interior least terns (*Sterna antillarum*) may feed or nest within the vicinity but are highly unlikely to be displaced or harmed by the proposed actions; therefore, any adverse effects are considered discountable. No other federally listed species known to occur in Denton County, Texas would be expected to be adversely impacted.

The EA indicates that if proposed construction activities occur during the migratory bird breeding season (February 15 through August 31), construction activities would avoid affects to any nesting migratory birds within the action area. Please note this project is not authorized for bird mortality for species that are protected under the MBTA.

Upon review of the EA and our information, we have no additional comments or recommendations to offer regarding the USACE’s Finding of No Significant Impact. Thank you for the opportunity to provide comments on the proposed action. If you have any questions, please contact Mr. Sean Edwards of my staff at 817-277-1100 ext. 2127.

Sincerely,

A handwritten signature in cursive script that reads "Debra T. Bills".

Debra Bills  
Field Supervisor





U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

Air Traffic Organization  
Central Service Center

10101 Hillwood Pkwy.  
Ft. Worth, TX 76177

FEB 01 2017

Douglas Sims, RPA  
Chief Environmental Compliance Branch  
Department of the Army  
Ft. Worth District, Corps of Engineers  
P.O. Box 17300  
Ft. Worth, TX 76102-0300

Dear Mr. Sims:

Thank you for your letter dated September 16, 2016, addressed to Mr. Michael O'Harra regarding the Request for comments in Environmental Assessment of Proposed Dam Safety Modifications Lewisville Dam, Elm Fork of the Trinity River, Lewisville, Texas. We normally participate in, and comment on, other federal agency environmental documents only from the perspective of the Federal Aviation Administration's (FAA) areas of responsibility; that is, whether the proposal will have effects on aviation and the National Airspace System. We generally do not provide comments from an environmental standpoint.

From a regularity perspective, you may need to consider if notice to FAA is required for the effect of the proposed actions on airspace. We encourage you to coordinate with the FAA's Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) office so that we can review the alternatives to provide you with the possible impacts. For information on the requirements for notifying the FAA, instructions for completing the forms, or other information regarding the airspace notification process, please visit the OE/AAA web site at: <https://oeaaa.faa.gov/oeaaaEXT/portal.isp>.

You will need to determine if formal notice to the FAA is required for the effect of the proposal on airspace. The requirements for this notice may be found in Title 14 of the Code of Federal Regulations, Part 77, Objects Affecting the Navigable Airspace. If any part of the project exceeds notification criteria under FAR Part 77, notice to the FAA is required at least 30 days prior to the proposed construction date. More information may be obtained at the OE/AAA web site.

Sincerely,

Robert W. Beck  
Manager, Operations Support Group  
ATO Central Service Center

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TEXAS HISTORICAL COMMISSION  
*real places telling real stories*

October 4, 2016

Marcia Hackett  
USACE, Fort Worth District  
PO Box 17300  
Fort Worth, Texas 76102-0300

Re: Project review under Section 106 of the National Historic Preservation Act of 1966, Review Draft— *Environmental Assessment Proposed Dam Safety Modifications Lewisville Dam, Elm Fork of the Trinity River, Lewisville, Denton County* (COE-Fort Worth District/ THC #201700454)

Dear Ms. Hackett:

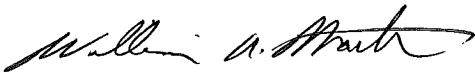
Thank you for providing us for review the above referenced project. This letter serves as comment on the proposed undertaking from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC).

Our staff, led by Rebecca Shelton, has completed its review of the Environmental Assessment (EA) and FONSI. We concur that the Lewisville Dam is not eligible for listing on the National Register of Historic Places under Criteria A or C, and no further investigations of the dam are warranted.

Overall, we concur with the results of the EA, yet we have several minor editorial comments to be addressed for the final EA. Please see the attached comments.

Thank you for your cooperation in this federal review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If you have any questions please contact Rebecca Shelton of our staff, at 512.463.6043 or [Rebecca.Shelton@thc.texas.gov](mailto:Rebecca.Shelton@thc.texas.gov)**

Sincerely,



for  
Mark Wolfe, State Historic Preservation Officer  
MW/rls



*Review Draft– Environmental Assessment Proposed Dam Safety Modifications Lewisville Dam, Elm Fork of the Trinity River, Lewisville, Denton County (THC# 201700454)*

Editorial Comments:

Throughout the report, evaluation of the Lewisville Dam should be updated to read “does not meet the criteria for Eligibility under Criteria A or C for the NRHP.” The THC concurred with these findings in a previous review of the Lewisville Dam Safety Modification Study, response dated July 7, 2016.

**3.7.4.2 Archeological Resources**

Page 3-45 Please spell out the trinomials for the seven previously unrecorded sites that are mentioned in the report.

Bryan W. Shaw, Ph.D., P.E., *Chairman*  
Toby Baker, *Commissioner*  
Jon Niermann, *Commissioner*  
Richard A. Hyde, P.E., *Executive Director*



## TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

September 21, 2016

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

Re: TCEQ NEPA Request #2016-165, Proposed Dam Safety Modifications to the Lewisville Dam on Elm Fork, Lewisville, Texas, Denton County

Dear Mr. Sims:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers the following comments:

A review of the project for general conformity impact in accordance with 40 CFR Part 93 indicates that the proposed project is located in Denton County, which is currently classified by the United States Environmental Protection Agency as moderate nonattainment for the 2008 ozone National Ambient Air Quality Standard. Therefore, general conformity rules apply.

The two primary precursors to ozone formation are volatile organic compounds (VOCs) and nitrogen oxides (NO<sub>x</sub>). A general conformity analysis may be required when a project results in an emissions increase of 100 tons per year or greater for either VOCs or NO<sub>x</sub>. Because the emissions from this proposed project are expected to be below these thresholds it is not anticipated to impact the state implementation plan; therefore a general conformity analysis is not required.

The Office of Water has no comment on this project.

Any debris or waste disposal should be at an appropriately authorized disposal facility.

Thank you for the opportunity to review this project. If you have any questions, please contact the agency NEPA Coordinator, at (512) 239-3500 or [NEPA@tceq.texas.gov](mailto:NEPA@tceq.texas.gov).

Sincerely,

A handwritten signature in black ink that reads "Mark Harmon". The signature is written in a cursive style with a long, sweeping underline.

Mark Harmon  
Division Director  
Intergovernmental Relations



October 13, 2016

Life's better outside.®

Ms. Marcia Hackett  
USACE Fort Worth District  
P.O. Box 17300  
Fort Worth, TX 76102-0300

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Executive Director

RE: Environmental Assessment and Draft Finding of No Significant Impact for Proposed Dam Safety Modifications to Lewisville Dam, Denton County TPWD Project No. 37053

Dear Ms. Hackett:

The Texas Parks and Wildlife Department (TPWD) received the September 16, 2016, notice regarding the availability of the Environmental Assessment (EA) and Draft Finding of No Significant Impact for the proposed Dam Safety Modifications to Lewisville Dam.

As the state agency with primary responsibility for protecting the state's fish and wildlife resources, in accordance with the authority granted by Parks and Wildlife Code §12.0011 and through coordination under the National Environmental Policy Act, TPWD has reviewed the EA and offers the following comments and recommendations.

**Project Description**

The U.S. Army Corps of Engineers Fort Worth District (USACE) proposes the following actions to address dam deficiencies, identified in the EA as potential failure modes (PFMs), and to minimize the potential for and consequences of a catastrophic downstream flooding event associated with dam failure:

- Seepage deficiencies at two locations would be addressed by constructing downstream inverted filter berms with associated collection trenches for seepage flow at each location (PFM 4A and 4B).
- Spillway instability deficiencies would be addressed by constructing post-tensioned anchors with an upstream geomembrane cutoff to support the spillway structure (PFM 6), overlaying the apron on the downstream side of the spillway (PFM 7), and constructing 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 (PFM 7).
- Erosion risk at the outlet conduit would be addressed by constructing new conduit to reduce stress from high volume flows (PFM 2).
- The risk of slides on the upstream side of the embankment would be addressed by increasing the embankment berm to a 4:1 upstream slop and a maximum elevation of 537 feet above sea level, and reinforcing the berm at the base with riprap to reduce wave action (PFM 8).

- To reduce the risk of embankment erosion from a potential waterline rupture, the City of Lewisville will be required to relocate waterlines that currently encroach on the embankment (PFM 10).

Of the PFMs listed above, PFM 2, 8, and 10 are not risk driven, but are included in the proposed action to take advantage of construction efficiencies and do reduce the overall risk of failure. Additional actions associated with the project include access roads, staging areas, and two borrow sites with disturbance footprints up to 56.4 and 32.1 acres, respectively. The project 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. All actions take place on Lewisville Dam and adjoining lake project lands south of the embankment and would be implemented in phases over seven years.

The EA indicates that refinements of the proposed actions during project development and public scoping resulted in a substantially smaller project footprint than originally evaluated with avoidance and minimization measures incorporated into the project to reduce potential impacts. Original scoping indicated up to approximately 3,700 acres could potentially be impacted, dependent upon which dam safety modifications would be needed following the risk assessment. With the refinements, the USACE retracted the initial Notice of Intent and moved forward with the analysis as an EA instead of an Environmental Impact Statement.

The EA concludes that the proposed action would not result in significant impacts on the social, economic, human, or natural environment. Beneficial impacts to biological resources, and specifically savanna habitat and pollinators, would occur with the implementation of habitat restoration measures following use of the borrow pits. The EA identifies special conservation measures (SCMs) to address invasive plants and zebra mussels (*Dreissena polymorpha*).

#### **TPWD Comments and Recommendations**

Although well-described in the narrative, the EA does not provide a visual depiction of the proposed actions or disturbance footprints other than for the borrow pits.

**Recommendation:** TPWD recommends including figures in the EA depicting the approximate disturbance footprints for the proposed action items with respect to soils, wetlands, floodplains, and habitat types.

The EA indicates that the borrow sites were selected based on suitability of fill and coordination with the Lewisville Lake Environmental Learning Area (LLELA) organizations and Lewisville Aquatic Ecosystem Research Facility (LAERF) to identify locations least likely to interfere with sensitive habitats, recreation and educational use of the project area. The EA indicates that savannah habitat restoration of the borrow sites would be conducted in cooperation with LLELA organizations. In TPWD's January 10, 2014, scoping letter, included in Appendix B of the EA, TPWD recommended minimizing the amount of habitat disturbance



downstream of the dam, assessing potential impacts to LLELA, providing mitigation for impacts associated with the borrow sites, and selecting dam safety modification measures that have the least amount of temporary and permanent impact to the more mature and diverse forested habitat, streams and wetlands within the project area while also providing an acceptable level of flood protection. The EA has addressed these recommendations.

**Comment:** TPWD supports changes in project design that resulted in the proposed borrow sites having a much smaller footprint than originally presented during scoping, being sited to minimize impacts to LLELA activities, being located to avoid or minimize impacts to areas of higher quality habitat in the project area, and being restored to native savannah habitat with attention to providing vegetation for pollinators.

SCM C-7 includes erosion control blankets or matting in the storm water pollution prevention plan. Many types of erosion control matting or blankets using mesh netting persist for many months after installation and can entangle native wildlife including snakes and birds.

**Recommendation:** For soil stabilization and/or revegetation of disturbed areas within the proposed project area, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic mesh matting should be avoided.

**Comment:** As recommended by TPWD during scoping, the EA has incorporated SCM PD-6 to inform construction personnel of sensitive species and habitats with the potential to occur in the project area, impacts that may occur, conservation measures to be implemented, and avoidance and reporting procedures.

TPWD's scoping letter recommended an assessment of potential impacts to state-listed and common native freshwater mussels that may occur in the footprint of proposed actions either in Lake Lewisville or in the Elm Fork Trinity River. The EA indicates minimal impacts to fish and other aquatic species through avoiding impact and using best management practices (BMPs) and SCMs to minimize potential construction-related indirect impacts to aquatic areas.

Appendix D, regarding Clean Water Act 404(b)(1) analysis of impacts to waters of the U.S., indicates that displacement of local biota would occur during construction and that mobile species would migrate to adjacent habitats. The EA indicates that sessile species would be impacted during construction activities, but over time and upon project completion, are expected to recolonize the project site at the same

diversity and density as currently present under pre-project conditions. The PFM 2 design includes construction along the outside of the outlet conduit, was chosen as the smallest impact footprint option, will maintain flows, and avoids significant excavation, thus minimizing or avoiding impacts to freshwater mussels that may occur in the outlet channel connecting to Elm Fork Trinity River.

The construction of PFM 8 would occur on the upstream side of the dam where irregular inundation causes varying lake levels and where periodic dredging for maintenance occur. However any benthos, including freshwater mussels, occurring in the project footprint would be impacted by PFM 8 actions. Without identifying whether the site contains suitable habitat and without surveying the area upstream of the dam, it is unknown if the proposed placement of fill and riprap in 5.1 acres of open water habitat would incur impacts to native freshwater mussels such as the state-listed threatened Texas heelsplitter (*Potamilus amphichaenus*) which is known to occur in Lewisville Lake.

**Recommendation:** TPWD recommends surveying for mussels in areas of suitable habitat of potentially-impacted waters in the study area. If state-threatened mussels are encountered, then TPWD recommends USACE incorporate impact mitigation measures, such as potential mussel relocation or monitoring.

TPW Code Section 1.011 grants TPWD authority to regulate and conserve aquatic animal life of public waters. Title 31 Section 57.157 of Texas Administrative Code (TAC) regulates take of mussels, including mussels that are not state listed. Under TPW Code Section 12.015, 12.019, 66.015 and TAC 52.101-52.105, 52.202, and 57.251-57.259, TPWD regulates the introduction and stocking of fish, shellfish, and aquatic plants into public waters of the state.

Dewatering activities can impact aquatic resources through stranding fish and mussels. Other harmful construction activities can trample, dredge or fill areas exhibiting stationary aquatic resources such as plants and mussels. To avoid or reduce impacts, TPWD recommends relocating native aquatic life to an area of suitable habitat outside the project footprint. Relocation activities are done under the authority of a TPWD *Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters* with an approved Aquatic Resource Relocation Plan (ARRP). Information regarding this permit can be obtained at <http://www.tpwd.texas.gov/publications/fishboat/forms/>. ARRPs assist in the permitting process to ensure that aquatic organisms are being handled properly and protected from danger during dewatering and/or relocation activities. Such plans are submitted to the appropriate TPWD Inland Fisheries or Coastal Fisheries Kills and Spills Team (KAST) for review. If dewatering activities and other project-related activities cause mortality to fish and wildlife species, then the responsible party could be liable for the value of the lost resources under the authority of TPW Code Sections 12.0011 (b) (1) and 12.301.

**Recommendation:** TPWD recommends that impact avoidance measures for aquatic organisms, including all native fish and freshwater mussel species,

Ms. Marcia Hackett

Page 5

October 13, 2016

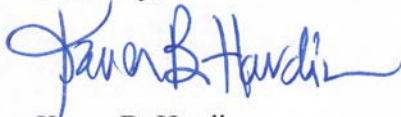
regardless of state-listing status, be considered during project planning and construction activities.

**Recommendation:** If construction involves dewatering activities, relocation of native fish, mussels or aquatic plants, or other activities (such as placement of temporary or permanent fills) that could result in take of aquatic species, then TPWD recommends the USACE or its construction contractor submit an ARRP to Greg Conley, TPWD Region 2 KAST at [greg.conley@tpwd.texas.gov](mailto:greg.conley@tpwd.texas.gov) to initiate coordination for a permit to introduce aquatic resources into public waters. The ARRP should be completed and approved by TPWD 30 days prior to activity within project waters and/or resource relocation.

**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 Texas Natural Diversity Database ([TexasNatural.DiversityDatabase@tpwd.texas.gov](mailto:TexasNatural.DiversityDatabase@tpwd.texas.gov)) and 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.

TPWD appreciates the USACE's consideration of these comments and recommendations in assessing the proposed actions. If you have any questions, please contact me at (903) 322-5001 or [Karen.Hardin@tpwd.texas.gov](mailto:Karen.Hardin@tpwd.texas.gov).

Sincerely,



Karen B. Hardin  
Wildlife Habitat Assessment Program  
Wildlife Division

kbh/37053(31270)

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## **Appendix C**

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### ***Fish and Wildlife Coordination Act Report and 2016 Draft Planning Aid Report***

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# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
2005 NE Green Oaks Blvd., Suite 140  
Arlington, Texas 76006

February 24, 2017

In Reply Refer to:  
02ETAR00-2011-I-0109

Colonel Calvin C. Hudson, II  
Commander, Fort Worth District, US Army Corps of Engineers Fort Worth, TX  
U.S. Army Corps of Engineers  
(Attn: Marcia Hackett, CESWF-PEC-CI)  
P.O. Box 17300  
Fort Worth, Texas 76102-0300

Dear Colonel Hudson:

This letter constitutes the Secretary of the Interior's Fish and Wildlife Coordination Act report on the Lewisville Dam Safety Modifications Project. It is submitted by the U.S. Fish and Wildlife Service (Service) to the U.S. Army Corps of Engineers (Corps) under the authority, and in accordance with, Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) to accompany the Corps' final Environmental Assessment (EA). The study was initiated by the Corps to evaluate potential environmental consequences resulting from implementation of proposed safety modifications to the Lewisville Dam in Lewisville, Texas. Our report has been coordinated with Fort Worth District's Regional Planning and Environmental Center (RPEC).

The purpose of this report is to identify and evaluate anticipated impacts of implementing the proposed project on fish and wildlife resources in the project area within the Upper Trinity River watershed and to recommend conservation measures for resource protection. This report is based on data collected during field investigations conducted by the Service, Texas Parks and Wildlife Department (TPWD), and Corps between October 16 and 23, 2013 and in November 2013; coordination with environmental consultants representing Cardno; information received from the Corps; and review comments from TPWD. A Planning Aid Report (PAR) has previously been submitted to the Corps regarding the existing fish and wildlife resources within the project area in June 2011 (USFWS 2011) and revised in 2014 (USFWS 2014). In 2015, the Corps had

developed a proposed action, and the Service could evaluate potential impacts associated with that action. Thus, an updated PAR was prepared and provided to the Corps in June 17, 2016 (USFWS 2016a).

## **1. STUDY AREA**

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. The project area consists of the Lewisville Dam and spillway, and the Corps-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. LLELA is managed for education, recreation, and ecological restoration by a consortium of organizations lead by the University of North Texas.

Only 291.2 acres of the total project area would be subject to direct impacts, 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. The term "Region of Influence," coined by the Corps, is synonymous with the term "study area." For consistency, "study area" will be used throughout this report.

## **2. BACKGROUND**

### **2.1 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 for use as a municipal water source, flood control, and recreational water use. 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, the Corps 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. Its construction assisted in preventing seasonal flooding in southeastern Denton County and has stimulated land development along the shores of the lake. 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-foot 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.



## **2.2 Lewisville Dam Safety**

The Corps 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 Lewisville Lake facilities do not meet Corps 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 Corps' highest priorities for risk reduction.

## **2.3 Dam Safety Studies**

The Corps is performing a Lewisville Lake Dam Safety Modification Study (DSMS), and has identified probable failure modes (PFMs). 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 as 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. 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 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 Corps 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 Corps monitoring, responsiveness, and emergency management of potential dam deficiencies would continue under the Future without Project Condition (FW/OPC), which would further reduce the likelihood of breach. Therefore, the combination of the low probability of failure with the high level of Corps attention makes catastrophic failure of the dam highly unlikely.

## **3. FISH AND WILDLIFE RESOURCES WITHIN THE STUDY AREA**

Sites were selected in an effort to document biotic communities in the study area. Two general assessment tools were selected for aquatic and terrestrial habitats: TPWD's Index of Biotic

Integrity (IBI) for assessing aquatic life use within a given waterbody and Service's habitat evaluation procedure (HEP).

### **3.1 Terrestrial Resources**

The study area is located in the 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 study 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 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). 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. Once stripped of protective grass, these areas eroded rapidly with disastrous effects. Given the relatively high rainfall and continuing suppression of fire by humans, 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).

Five terrestrial habitat types were evaluated using the Service's Habitat Evaluation Procedures (HEP) using data compiled from previous site visits between October 16 and 23, 2013 and re-verified in 2016. These habitats were evaluated throughout the study area, and then special focus was paid to the habitat within the action area, that is, the area subject to disturbance by the Proposed Action. Table 1 displays the areas of analysis.

**Table 1. Habitats within the Study Area and Action Area**

| <i>Habitat</i>    | <i>Study Area</i> |                        | <i>Action Area</i> |                         |
|-------------------|-------------------|------------------------|--------------------|-------------------------|
|                   | <i>Acres</i>      | <i>% of Study Area</i> | <i>Acres</i>       | <i>% of Action Area</i> |
| Riparian Woodland | 302.2             | 8.6                    | 7.6                | 2.6                     |
| Upland Forest     | 1,197.7           | 34.2                   | 48.1               | 16.5                    |
| Wetlands          | 117.8             | 3.4                    | 0.3                | 0.1                     |
| Grassland         | 594.4             | 17.0                   | 77.2               | 26.5                    |
| Savanna           | 1,002.4           | 28.6                   | 114.7              | 39.4                    |
| Lacustrine        | 43.7              | 1.2                    | 17.7               | 6.1                     |
| Riverine          | 25.0              | 0.7                    | 0.5                | 0.2                     |
| Urban Development | 215.6             | 6.3                    | 25.1               | 8.6                     |
| <b>Total</b>      | <b>3,498.8</b>    | <b>100</b>             | <b>291.2</b>       | <b>100</b>              |

Seven wildlife indicator species were selected to represent the wildlife communities that use the five habitats evaluated. 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.

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. 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.

Baseline terrestrial 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 (HU) are calculated by multiplying the numeric HSI values by the amount of acres of habitat available.

The 2014 PAR includes a complete list of plant species observed during the surveys (2014 PAR 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 (2014 PAR Appendix B); and photographs taken in each compass direction from the center of each survey site (2014 PAR Appendix D) (USFWS 2014). 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.

### 3.1.1 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.

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).

**Table 2. Existing HSI and HU Values for Riparian Woodland Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>  |
|--------------------------|-------------|
| Barred Owl               | 0.25        |
| Wood Duck                | 0.04        |
| Downy Woodpecker         | 0.60        |
| Fox Squirrel             | 0.92        |
| <b>HSI Average</b>       | <b>0.45</b> |
| Acres                    | 7.6         |
| <b>Habitat Units</b>     | <b>3.42</b> |

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.

### 3.1.2 Upland Forest:

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.

The overall HSI for the upland forest is below average at 0.30; the total HUs for the action area is 14.43 (Table 3).

**Table 3. Existing HSI Values for Upland Forest Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>Action Area</i> |
|--------------------------|--------------------|
| Barred Owl               | 0.30               |
| Downy Woodpecker         | 0.57               |
| Fox Squirrel             | 0.03               |
| <b>HSI Average</b>       | <b>0.30</b>        |
| Acres                    | 48.1               |
| <b>Habitat Units</b>     | <b>14.43</b>       |

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.

### 3.1.3 Wetlands

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.

The overall HSI for the wetlands is below average at 0.19; the total HUs for the entire action area is 0.06 (Table 4).

**Table 4. Existing HSI Values for Wetland Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>  |
|--------------------------|-------------|
| Wood Duck                | 0.04        |
| Belted Kingfisher        | 0.33        |
| <b>HSI Average</b>       | <b>0.19</b> |
| Acres                    | 0.3         |
| <b>Habitat Units</b>     | <b>0.06</b> |

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.

### 3.1.4 Grasslands

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.

The overall HSI for the grassland is below average at 0.48; the total HUs for the entire action area is 37.06 (Table 5).

**Table 5. Existing HSI Values for Grassland Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>   |
|--------------------------|--------------|
| Eastern Meadowlark       | 0.82         |
| Eastern Cottontail       | 0.13         |
| <b>HSI Average</b>       | <b>0.48</b>  |
| Acres                    | 77.2         |
| <b>Habitat Units</b>     | <b>37.06</b> |

The limiting factor for grassland habitat for the action area is listed below.

- Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation).

### 3.1.5 Savanna

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.

The overall HSI for the savanna is below average at 0.29; the total HUs for the entire action area is 33.26 (Table 6).

**Table 6. Existing HSI Values for Savanna Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>   |
|--------------------------|--------------|
| Eastern Meadowlark       | 0.36         |
| Eastern Cottontail       | 0.52         |
| Fox Squirrel             | 0            |
| <b>HSI Average</b>       | <b>0.29</b>  |
| Acres                    | 114.7        |
| <b>Habitat Units</b>     | <b>33.26</b> |

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).

## 4. AQUATIC RESOURCES

### 4.1 Riverine

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 7).

**Table 7. Existing IBI Values for Aquatic Riverine Survey Sites**

| <i>Sampling Site</i> | <i>IBI</i>  |
|----------------------|-------------|
| 1                    | 0.71        |
| 2                    | 0.75        |
| 3                    | 1.00        |
| 4                    | 0.88        |
| 5                    | 0.98        |
| <b>Average IBI</b>   | <b>0.86</b> |

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.

### 4.2 Lacustrine

Lacustrine 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 Corps. 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.

## 5. ENDANGERED AND THREATENED SPECIES

Based on the Service 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).

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 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, dredged 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 action 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 Service should be notified to discuss alternative development plans or the need for consultation under Section 7 of the Endangered Species Act.

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 Service's National Bald Eagle Management Guidelines.

Based on a review of impacts described here, the Service has determined that no impacts to interior least terns, or any other federally-listed species, are expected as a result of the implementation of the Proposed Action.



## 6. CONSIDERATION OF PROJECT ALTERNATIVES

The Corps evaluated two alternatives in the Lewisville Dam Safety Modifications EA: the No Action, evaluated as the FW/OPC, and the Proposed Action, including the implementation of the dam safety modifications, ancillary improvements including access roads and borrow areas, and habitat measures.

### 6.1 The No Action Alternative

#### 6.1.1 Description

The No Action Alternative, or FW/OPC, is an alternative that assumes no action is taken. An analysis of the No Action Alternative is included to establish baseline conditions against which potential impacts can be evaluated.

#### 6.1.2 Impact Analysis and Discussion

Table 8 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 8. 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    |
| <b>Riparian Woodland</b> |                     |       |       |       |       |       |       |
| 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  |
| <b>Upland Forest</b>     |                     |       |       |       |       |       |       |
| 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 |
| <b>Wetland</b>           |                     |       |       |       |       |       |       |
| HSI                      | 0.19                | 0.19  | 0.19  | 0.19  | 0.19  | 0.19  | 0.19  |

**Table 8. 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    |
| 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  |
| <b>Grassland</b> |                     |       |       |       |       |       |       |
| 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 |
| <b>Savanna</b>   |                     |       |       |       |       |       |       |
| 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 |
| <b>Riverine</b>  |                     |       |       |       |       |       |       |
| 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 9, 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 9. 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         |
| <b>Total HU</b>   | <b>88.66</b> | <b>102.78</b> | <b>14.12</b> |

## **6.2 Proposed Action**

### **6.2.1 Description**

Under the Proposed Action, the Corps would reduce risk of dam failure from seepage deficiencies at two different locations (PFMs 4A and 4B) by constructing downstream inverted filter berms with associated collection trenches for seepage flow at each location. The Corps would reduce the risk of dam failure associated with spillway instability (PFMs 6 and 7) 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.

To reduce risk associated with erosion at the outlet conduit (PFM 2), the Corps 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 (PFM 8), the Corps 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. The Corps 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. After the modifications to the embankment are complete, the Corps would also establish a 50-foot wide “vegetation clear zone” adjacent to the embankment where vegetation would be regularly mowed.

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 locations 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 the existing surrounding topography, as possible. After the borrow areas have been graded, the Corps would implement habitat measures to create enhanced savanna habitat.

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.

### **6.2.1 Impacts Analysis and Discussion**

Table 10 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 50 years following project implementation. 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.

**Table 10. 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    |
| <b>Riparian Woodland</b>          |                     |      |       |       |       |       |       |
| 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     |
| <b>Upland Forest</b>              |                     |      |       |       |       |       |       |
| 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 |
| <b>Wetland</b>                    |                     |      |       |       |       |       |       |
| 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  |
| <b>Grassland</b>                  |                     |      |       |       |       |       |       |
| 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 |
| <b>Savanna – Habitat Measures</b> |                     |      |       |       |       |       |       |
| 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 |
| <b>Savanna – All Other</b>        |                     |      |       |       |       |       |       |
| 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  |
| <b>Riverine</b>                   |                     |      |       |       |       |       |       |
| 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  |

Table 11 presents the existing conditions (baseline) and the Proposed Action Alternative (Year 50) HUs for the habitat types in the action area. 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 11. Estimated HU Values for Habitats within the Action Area under Baseline and Proposed Action Alternative (Year 50)**

| <i>Habitat</i>             | <i>HUs</i>      |                        |               |
|----------------------------|-----------------|------------------------|---------------|
|                            | <i>Baseline</i> | <i>Proposed Action</i> | <i>Change</i> |
| 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          |
| <b>Total HU</b>            | <b>88.66</b>    | <b>121.14</b>          | <b>32.48</b>  |

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 pollinators may be of limited use to HEP species, 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.

## **7. COMPARISON OF HABITAT UNITS AT YEAR 50 FOR ALL ALTERNATIVES**

Perhaps the most effective method to compare project alternative effects on wildlife habitat over time is in comparison of changes to HU. As stated prior, HUs are calculated by multiplying the numeric HSI values by the amount of acres of habitat available. This comparative analysis accounts for both changes to habitat acreage as well as habitat suitability. Table 12 illustrates a comparison of HUs for both project alternatives at year 50.

**Table 12. Estimated HU Values for Habitats within the Action Area under Baseline and Proposed Action Alternative as Compared to FW/OPC (Year 50)**

| <i>Habitat</i>    | <i>Existing Conditions</i> | <i>FW/OPC</i> |                   | <i>Proposed Action</i> |                   |
|-------------------|----------------------------|---------------|-------------------|------------------------|-------------------|
|                   | <i>HU</i>                  | <i>HU</i>     | <i>Difference</i> | <i>HU</i>              | <i>Difference</i> |
| 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                 | 0.06                   | 0.00              |
| Grassland         | 37.06                      | 37.83         | 0.77              | 41.37                  | 4.31              |
| Savanna           | 33.26                      | 17.52         | -15.74            | 57.95                  | 24.69             |
| Riverine          | 0.43                       | 0.44          | 0.01              | 0.44                   | 0.01              |
| <b>Total HU</b>   | <b>88.66</b>               | <b>102.78</b> | <b>14.12</b>      | <b>121.14</b>          | <b>32.48</b>      |

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.

**8. RECOMMENDED FISH AND WILDLIFE CONSERVATION MEASURES**

The Service has evaluated this project in accordance with the guidelines and directives contained in the Fish and Wildlife Mitigation Policy (Federal Register 46(15):7644-7663; January 23, 1981; revised Federal Register 81: 83440-83492; November 21, 2016). Prior fieldwork and analysis for this project were completed in compliance with the 1981 Fish and Wildlife Mitigation Policy. Therefore, the contents of this Fish and Wildlife Coordination Act Report are also consistent with the 1981 policy. The Mitigation Policy is the basis by which the Service makes recommendations, in order of priority, to avoid, minimize, rectify, reduce or eliminate the loss over time, or compensate project-related impacts to fish and wildlife resources. Our recommendations are based on the value and relative abundance of the affected habitats to the evaluation species. The 1981 Policy includes four Resource Categories (1-4) to provide a

consistent value rating for wildlife habitats. Based on the HSI values and IBI evaluations, the Service has designated a Resource Category for each terrestrial habitat in each area assessed and aquatic habitat in each segment studied.

### **8.1 Aquatic Habitat**

The Service has designated the aquatic habitats within the study area as Resource Category 3. Category 3 habitat is of high to medium value for the evaluation species and is relatively abundant on a national basis. The mitigation goal for this category is no net loss of habitat value while minimizing loss of in-kind values. As noted in our IBI (2014 PAR Appendix F), the Elm Fork support exceptional fisheries, and therefore, impacts to this system should be avoided and/or minimized before any enhancement of these resources might occur (USFWS 2014).

Any temporary construction impacts to aquatic habitats would be self-mitigating and the Service concludes that no additional mitigation efforts would be necessary.

The Service recommends that best management practices be implemented to control the increased pollutant loading in storm water runoff associated with construction activities and the projected increase in traffic usage within this area.

### **8.2 Terrestrial Habitat**

All terrestrial habitats within the project area have medium to low habitat value for the evaluation species and have been designated as Resource Category 4. The mitigation planning goal for Category 4 habitat is to minimize loss of habitat value. Out-of-kind habitat values may be used for mitigation. Habitat improvements and restoration measures proposed for the project may be used for the mitigation of adverse impacts associated with the construction of the preferred plan of development.

As stated prior, implementation of the Proposed Action would result in the improvement of upland forests and savanna habitats, while offsetting impacts to riparian woodlands via pollinator habitat creation. Consequently, the losses to fish and wildlife resources associated with Proposed Action are expected to be self-mitigating and would be acceptable from a fish and wildlife resource perspective.

Implementation of the Proposed Action would result in net gains of terrestrial habitat quality and acreage. Any temporary construction impacts to terrestrial habitats would be self-mitigating and the Service concludes that no additional mitigation efforts would be necessary.

Executive Order 11990 requires all Federal agencies to “take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.” Wetlands are of national importance and have been documented as one of the most productive and important habitats for a variety of fish

and wildlife species. At year 50, the Proposed Action would result in a no net change to study area wetlands.

**9. SUMMARY OF FINDINGS AND FISH AND WILDLIFE SERVICE'S POSITION**

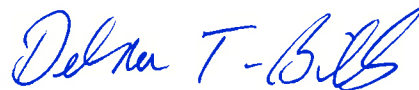
Due to the lack of suitable habitat and the urbanized character of the project area, it is unlikely that any federally listed threatened or endangered species would become established in any of the study areas. Therefore, adverse effects to federally listed species are not anticipated with implementation of the Proposed Action.

No permanent detrimental effects to aquatic or terrestrial communities within the project area would be expected to occur from the implementation of any of the project alternatives. Long term effects of the Proposed Action would result in net benefits to fish and wildlife resources. Therefore, no additional mitigation efforts are recommended.

The Service commends the Corps for incorporating pollinator habitat creation/restoration plans into the action alternatives. These efforts would fully compensate for the impacts caused by initial project construction. These actions would provide additional benefits to fish and wildlife resources, and the public's enjoyment of these resources, throughout the entire project area.

In summary, we believe the implementation of these recommended measures would serve to minimize the adverse impacts associated with the proposed project. We appreciate the opportunity to provide our evaluation and recommendations on this project. Please contact Sean Edwards of my staff at (817) 277-1100 if you have any questions or require additional assistance.

Sincerely,



Debra Bills  
Field Supervisor



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**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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## 1 EXECUTIVE SUMMARY

2 This planning aid report (PAR) describes fish and wildlife resources within the Lewisville Dam Safety  
3 Modification Project study area in Denton County, Texas, and is intended to assist the United States  
4 (U.S.) Army Corps of Engineers (USACE) in their planning efforts for the associated Environmental  
5 Assessment (EA).

6 USACE's Fort Worth District, Trinity Region, has initiated preparation of a Dam Safety Evaluation Study  
7 to plan and evaluate options available for safety-related modifications to Lewisville Dam, Denton County,  
8 Texas. From the Interim Risk Reduction Measures Plan, Lewisville Dam, Texas, dated 28 December  
9 2009, several potential problems were identified related to dam safety that were addressed more  
10 specifically during studies conducted in 2010 and 2013. Areas of concern were identified along  
11 seepage/stability areas, and with potential instability of the weir and apron at the spillway. In order to  
12 address these concerns, USACE is proposing to implement modifications that would reduce underseepage  
13 at two locations, reduce erosion along the outfall structure, and improve stability at the spillway. In order  
14 to implement these modifications, USACE would require geotechnically-appropriate fill for use at the  
15 embankment. To this end, two potential borrow areas have been identified adjacent to the Lewisville  
16 Dam. USACE is also proposing habitat measures in the borrow areas after the sites are no longer needed  
17 for borrow/fill. These measures would establish savanna habitat for long-term maintenance with the aim  
18 of providing quality habitat for regional pollinators, especially the monarch butterflies that migrate along  
19 Interstate 35.

20 The region of influence (ROI), or project area, includes 3,498.8 acres of land, 215.6 acres of which are  
21 already developed. The 3,283.2 undeveloped acres consist of two aquatic and five terrestrial habitat types  
22 for biological resources: lacustrine (43.7 acres), riverine (25.0 acres), riparian woodland (302.2 acres),  
23 upland forest (1197.7 acres), wetland (117.8 acres), grassland (594.4 acres), and savanna (1,002.4 acres).  
24 Within the project area, the action area, i.e., the area subject to disturbance by the Proposed Action,  
25 encompasses a total of 291.2 acres and includes 17.7 acres of lacustrine habitat, 0.5 acre of riverine  
26 habitat, 7.6 acres of riparian woodlands, 48.1 acres of upland forest, 0.3 acres of wetland habitat, 77.2  
27 acres of grassland, and 114.7 acres of savanna. The action area also includes 25.1 acres of urban area;  
28 these areas were excluded from the habitat suitability analysis.

29 In June 2011, the U.S. Fish and Wildlife Service (USFWS) submitted a Planning Aid Letter (PAL) to  
30 USACE that described the existing fish and wildlife resources within the Lewisville Lake Dam Safety  
31 Modifications USACE property study area in Denton County, Texas using the Habitat Evaluation  
32 Procedures (HEP). Since that time, USACE conducted an additional HEP Study in October 2013. This  
33 study revisited the original 20 HEP data collection sites as well as visited an additional 60 sites in order to  
34 analyze a more robust sample of the habitats present. Also in 2013, USACE commissioned the USFWS to  
35 conduct an aquatic Index of Biotic Integrity (IBI) Study. Results and discussion of the 2013 follow-up  
36 HEP and IBI Studies were discussed in an updated version of the PAL submitted in 2014. USFWS and  
37 USACE personnel cooperated in collecting the habitat field data required to complete this report. The data  
38 collected from the 80 sites visited in 2013 along with the analyses in the 2014 PAL served to inform the  
39 analysis in this report.

40 In preparation of this report, USACE mapping was utilized to identify and update vegetation cover types  
41 and distribution, and perform habitat evaluations of each cover type using the USFWS's HEP.

1 To varying degrees, most of the study area has been subjected to past and/or ongoing human disturbance  
 2 from nearby commercial and residential activities, recent long-term cattle grazing, automotive traffic,  
 3 recreational activities, runoff of pollutants, etc. Wildlife habitat quality appears to vary throughout the  
 4 area investigated. Areas subjected to less frequent impact appear to contain reasonably intact riparian  
 5 forested patches and upland grasslands. These and other areas removed from permanent urbanized  
 6 development are most likely to benefit from preservation and restoration efforts to improve habitat  
 7 diversity and quality, while promoting a variety of resident and migratory wildlife species.

8 Due to the character and quality of the habitats observed within the project area, it is unlikely that any  
 9 federally listed threatened or endangered species would be present; however, there is suitable habitat for  
 10 special status species within the area. There is also potential for some special status bird species as well as  
 11 neotropical migrant songbirds to transit the ROI, using the grassland, bottomland hardwood, wetland, and  
 12 riverine habitats for resting and feeding during migration. Several federal- species have the potential to be  
 13 found in and around the Project Area. Per the USFWS Information for Planning and Conservation Report,  
 14 two endangered birds, the least tern (*Sterna antillarum*) and the whooping crane (*Grus americana*) have  
 15 the potential to occur and be affected by the Proposed Action Alternative. Nineteen species of birds listed  
 16 as Birds of Conservation Concern by the USFWS may occur within the general vicinity of ROI.

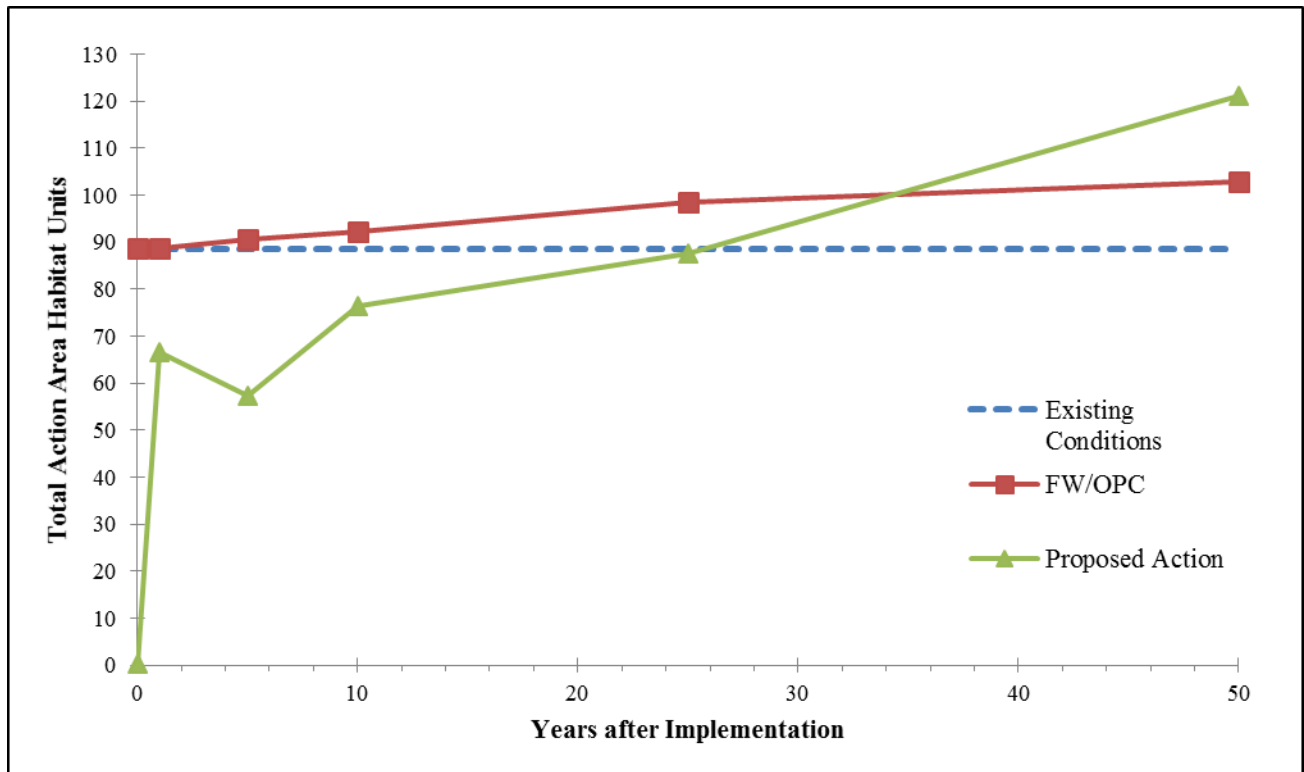
17 As shown in Table ES-1, habitat units (HUs) would decrease for savanna under the Future without Project  
 18 Condition, but would substantially increase under the Proposed Action. Upland forest and grassland  
 19 habitats would improve under both alternatives, with substantially larger increases for upland forest under  
 20 the Future without Project Condition as compared to the Proposed Action. There is no difference in the  
 21 projected HUs for aquatic riverine habitat or wetland habitat.

**Table ES-1. Comparison of Habitat Units at Year 50 for All Alternatives**

| <i>Habitat Type</i>        | <i>Existing Conditions</i> | <i>Future without Project Condition</i> |                   | <i>Proposed Action Alternative</i> |                   |
|----------------------------|----------------------------|---|-------------------|------------------------------------|-------------------|
|                            | <i>HU</i>                  | <i>HU</i>                               | <i>Difference</i> | <i>HU</i>                          | <i>Difference</i> |
| 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              |
| <b>Total</b>               | <b>88.66</b>               | <b>102.78</b>                           | <b>14.12</b>      | <b>121.14</b>                      | <b>32.48</b>      |

1 Chart ES-1 presents all the HUs combined over time. The Proposed Action would have short-term  
 2 impacts to habitat. However, habitat improvements would develop over time under the Proposed Action,  
 3 especially in rapidly recovering grasslands and savanna. These HUs would increase the most from Year 0  
 4 to 10 due to the rapid growth of most grassland and savanna vegetation.

**Chart ES-1. Change in Combined Habitat Units under All Alternatives**



5 One of the primary goals of proposed habitat measures is to establish savanna habitat that supports a  
 6 robust, resilient, and diverse pollinator community. Elements of the habitat measures, such as planting of  
 7 flowering shrubs and choice of specific, pollinator-favored herbaceous vegetation, are not captured by  
 8 HEP modelling, but still provide substantial increased to habitat health over all. Furthermore, the tree  
 9 species proposed for planting in the savanna mottes are generally slow growing and would likely take  
 10 more than 50 years to reach functional maturity and mast production. Thus, it is likely that habitat values  
 11 would continue to improve beyond 50 years, in addition to continuing to provide an oasis of quality  
 12 pollinator habitat in a highly developed region.

**1 ACKNOWLEDGEMENTS**

2 The Fort Worth District's Regional Planning and Environmental Center (RPEC) provided the USFWS the  
3 information necessary for completing this report. Daniel Allen and Mandy McGuire, Environmental  
4 Planners with the RPEC, assisted with field work, reviewed data, and provided essential information.  
5 Marcia Hackett, RPEC Regional Technical Specialist and Lewisville Dam Safety Modification EA  
6 Environmental Lead, also reviewed data and provided information critical to completing this document.  
7 Additional support was provided from the USACE Operations personnel, Trinity Regional Office, as well  
8 as personnel from Texas Parks and Wildlife Department.

9 Several USFWS biologists assisted with this report. Sean Edwards served as lead Biologist for this study  
10 between 2009 and 2016, organized and led the field work, and completed preliminary data computation.  
11 Jacob Lewis was the lead for the IBI portion of this study. Debra Bills, Field Supervisor, reviewed and  
12 provided guidance necessary to complete this report. Additional

13 Dr. Mike Dungan, Blake Claypool, Lorraine Shaughnessy, Erica Boulanger, Jason Harshman, and  
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**U.S. FISH AND WILDLIFE SERVICE HABITAT CONDITIONS  
 PLANNING AID REPORT  
 FOR THE LEWISVILLE DAM PROJECT**

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## Acronyms and Abbreviations

|        |  |       |   |
|--------|--|-------|---|
| %      | percent  | msl   | mean sea level                                |
| BCC    | Birds of Conservation Concern                  | PAL   | Planning Aid Letter                           |
| dbh    | diameter at breast height                      | PAR   | Planning Aid Report                           |
| EA     | Environmental Assessment                       | PFMs  | potential failure modes                       |
| °F     | degree Fahrenheit                              | PFMA  | Potential Failure Mode Analysis               |
| FW/OPC | Future without Project Condition               | RPEC  | Regional Planning and Environmental<br>Center |
| HEP    | Habitat Evaluation Procedures                  | ROI   | region of influence                           |
| HSI    | habitat suitability index                      | TPWD  | Texas Parks and Wildlife Department           |
| HU     | habitat unit                                   | U.S.  | United States                                 |
| IBI    | Index of Biotic Integrity                      | USACE | U.S. Army Corps of Engineers                  |
| IPaC   | Information for Planning and Conservation      | USFWS | U.S. Fish and Wildlife Service                |
| LLELA  | Lewisville Lake Environmental Learning<br>Area |       |   |

# 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.

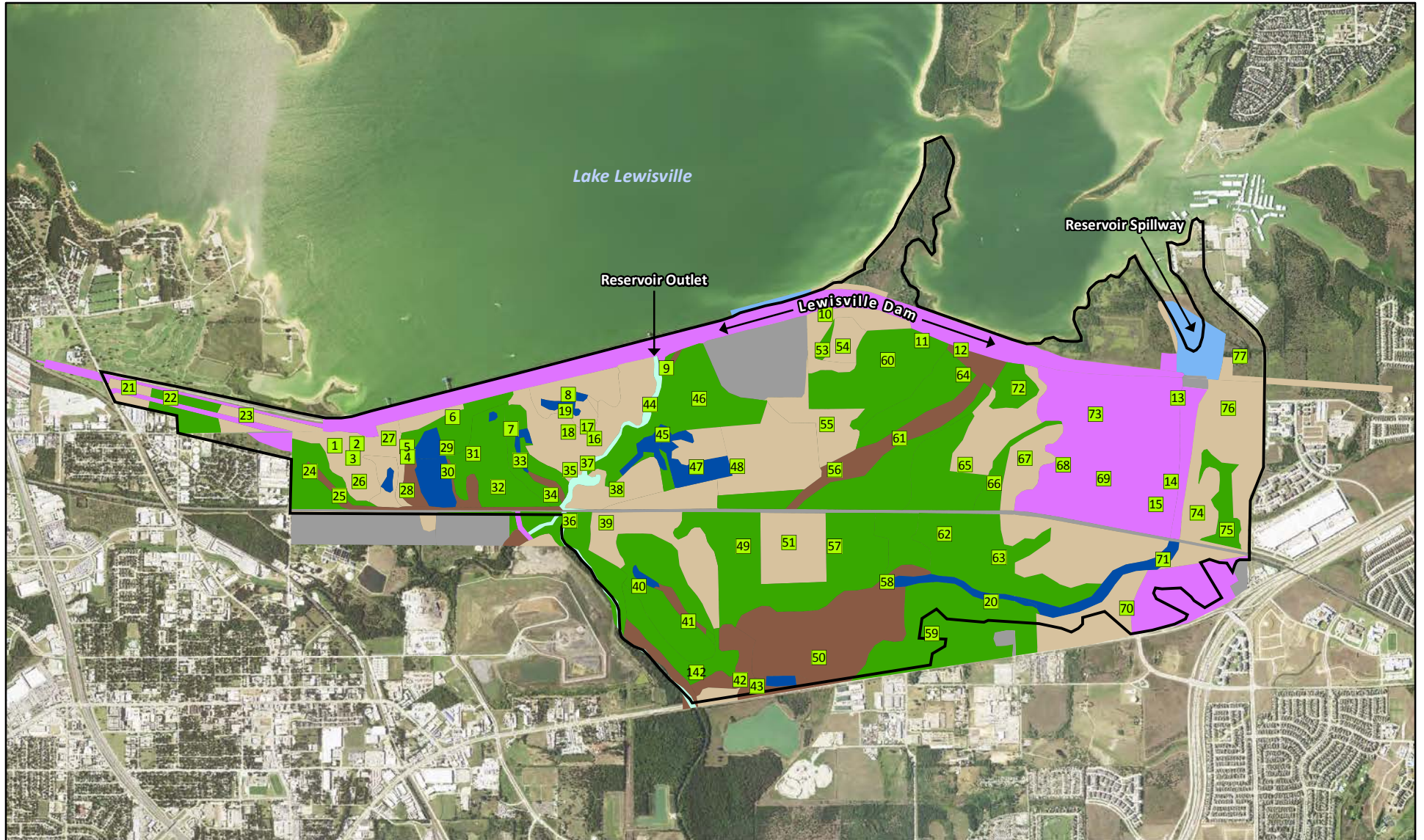
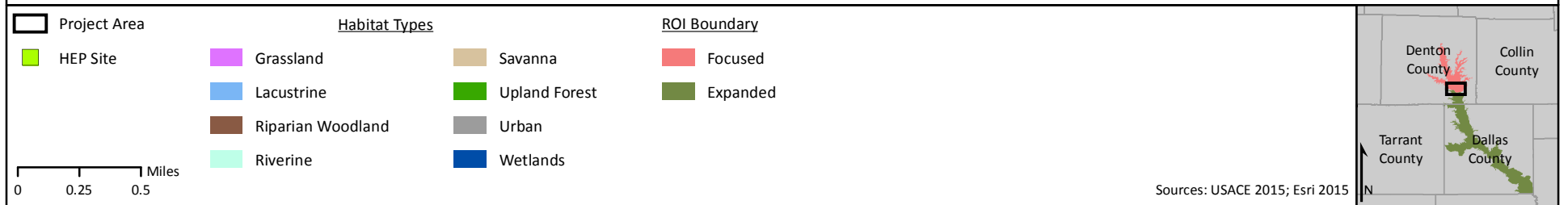


Figure 1-1. Lewisville Dam Safety Modifications Project Area, Cover Types, and 2013 HEP Sites



Sources: USACE 2015; Esri 2015

## 1 **1.2 PURPOSE/PROJECT DESCRIPTION**

2 The purpose of the Proposed Action is to remediate the conditions at the Lewisville Lake Dam that  
3 currently threaten dam stability. These deficiencies include seepage flow under the dam, spillway weir  
4 instability, and apron instability at the spillway. The Proposed Action is needed to establish the Lewisville  
5 Dam as a safe facility that meets USACE risk reduction guidelines for existing dams and allows the  
6 project to provide the benefits for which it was authorized. Figure 1-2 displays the habitats present in the  
7 project area, as well as the major features of the Lewisville Dam.

8 A Potential Failure Mode (PFM) Analysis (PFMA) of the Lewisville Dam was conducted on 23 through  
9 27 February 2009 at the Trinity Regional Project Office in Lewisville. The intent of the PFMA was to  
10 identify the PFMs that were considered to be credible and significant (risk-drivers) or considered to be a  
11 significant contributor to the dam's overall risk. Twenty-three total PFMs were identified in the course of  
12 the analysis; three of those (PFM 4, 6, and 7) were determined to be the primary risk factors driving risk.

13 USACE developed eight alternative approaches to reduce risk for each of the risk-driving PFMs. In the  
14 course of developing risk reduction alternatives, USACE determined that any treatment addressing PFMs  
15 4, 6, and 7 could be efficiently and effectively expanded to also address PFMs 2 and 8. While these PFMs  
16 are not risk-driving, they are identified risks, and the USACE elected to continue analysis with these  
17 PFMs included. After analysis of quantified risk reduction, USACE identified a Proposed Action  
18 alternative to carry forward for detailed analysis.

### 19 **1.2.1 PFM 2**

20 PFM 2 refers to the risk associated with internal erosion of the Lewisville Dam embankment along the  
21 outlet conduit (Figure 1-2). There are no indications of any near-term concerns at the conduit, so the  
22 probability is remote. However, the consequences would be high if failure were to occur. The risk  
23 associated with this PFM is relatively low, but measures to address it are included to take advantage of  
24 construction and design efficiencies.

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

### 30 **1.2.2 PFM 4A**

31 PFM 4 generally refers to the risks associated with water seeping under the embankment, which could  
32 result in internal erosion of foundation along sand zones located in the foundation if not effectively  
33 monitored and controlled. When seepage in the sandy alluvial foundation materials is uncontrolled,  
34 backwards erosion/piping of the foundation may result. Erosion and piping result in the loss of  
35 embankment materials, which then causes instability of the embankment toe, increasing the exit flow and  
36 allowing for gross enlargement of the unfiltered pipe exit.

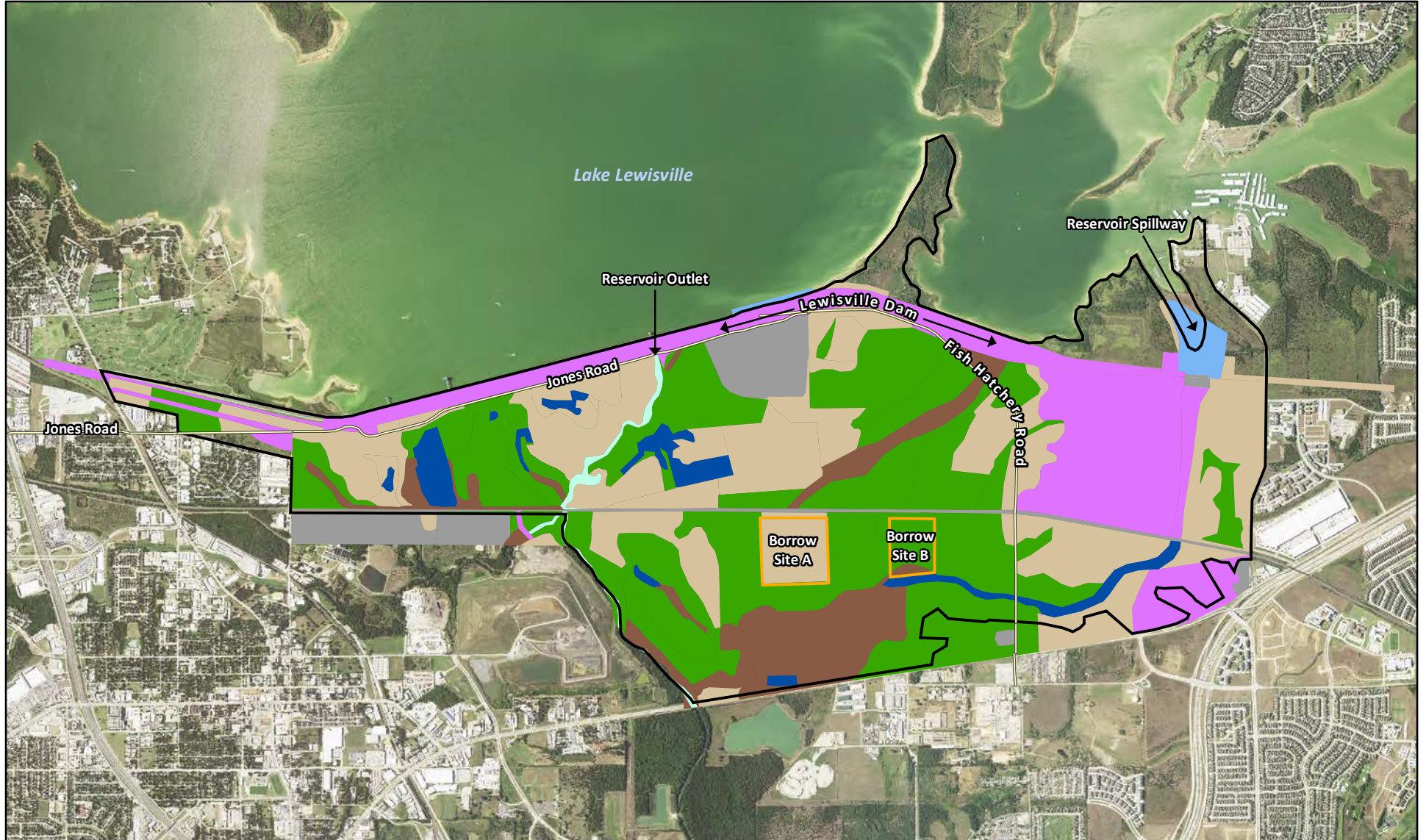
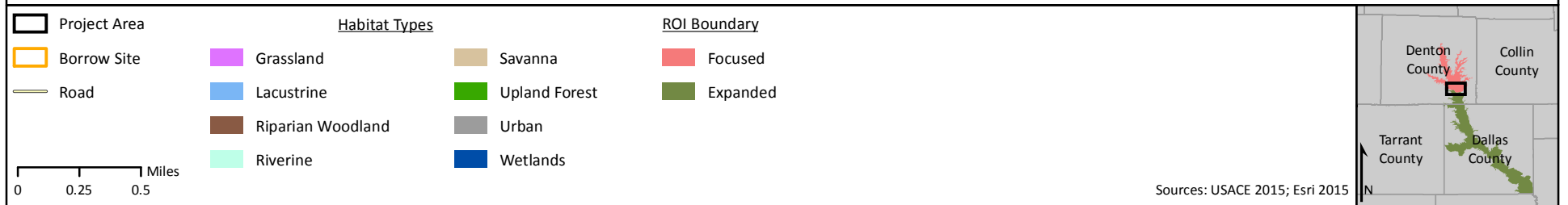


Figure 1-2. Lewisville Dam Major Features and Proposed Borrow Areas



Sources: USACE 2015; Esri 2015



1 PFM 4A refers specifically to the seepage occurring at “Seepage Area 1.” This seepage carries a moderate  
2 to low probability of internal erosion and piping from high seepage volumes but because the  
3 consequences associated with this PFM are very high, the overall risk is considered high. PFM 4A is a  
4 risk-driving measure for the Proposed Action.

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

15 Dewatering would be required for this construction. Two City of Lewisville water supply lines would  
16 have to be relocated prior to the beginning of the construction. This relocation has been incorporated into  
17 the Proposed Action.

### 18 **1.2.3 PFM 4B**

19 PFM 4B refers specifically to the seepage occurring at “Seepage Area 2.” This seepage carries a low to  
20 remote probability of internal erosion and piping from high seepage volumes at extreme events, but  
21 because the consequences associated with this PFM are very high, the overall risk is considered moderate  
22 to high. PFM 4B is a risk-driving measure for the Proposed Action.

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

### 30 **1.2.4 PFM 6**

31 PFM 6 refers to the spillway weir (refer to Figure 1-2) sliding on its foundation. When the spillway  
32 experiences strong uplift pressures from extreme pool levels, the existing instability may lead to sliding  
33 and breach of the weir. The uplift pressures acting on weir structures initiate progressive failure of  
34 spillway components and the underlying foundation materials. The probability for extreme events seen  
35 only under modeling conditions is high, and lowers as elevations reach those associated with actual pool  
36 elevations. The consequences associated with this PFM are high. The resulting risk is considered high.  
37 PFM 6 is a risk-driving measure for the Proposed Action.

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

#### 9 **1.2.5 PFM 7**

10 PFM 7 refers to the spillway weir instability due to spillway apron failure during high velocities and high  
11 stagnation pressure in the existing offset joints in the apron slabs leads to undermining and sliding of the  
12 spillway weir, resulting in loss of pool. Stagnation pressures fail successive apron slabs to initiate a  
13 progressive failure of spillway components and the underlying foundation materials. The probability for  
14 extreme events seen only under modeling conditions is moderate, and lowers as elevations reach those  
15 associated with actual pool elevations. The consequences associated with this PFM are high. The resulting  
16 risk is considered high.

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

#### 25 **1.2.6 PFM 8**

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

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

32 The embankment berm would be constructed to an elevation of 537.0 with a 15-foot top width and 4:1  
33 upstream slope. The embankment berm would have rock riprap protection on the upstream slope to  
34 protect against wave erosion. The fill for the embankment berm would come from the proposed borrow  
35 locations. Additional analysis would be completed to determine the need for lime treatment of this  
36 material. The crest modification would include removing the existing pavement and removal of  
37 approximately 6 feet of the embankment. The material from the embankment would be lime treated and  
38 replaced. The crest would be sloped to the downstream and a geomembrane added prior to repaving the  
39 crest road. Further analysis would determine the depths of the existing embankment that would receive  
40 the lime treatment.

### 1 1.2.7 Ancillary Features

2 In addition to these PFM treatments, several ancillary actions are anticipated, including access roads,  
 3 utility relocation, and establishment of borrow and staging areas. Two borrow areas, referred to as Borrow  
 4 Area A (56.4 acres) and Borrow Area B (32.1 acres) have been identified. The borrow areas were sited  
 5 with input from the management of the Lewisville Lake Environmental Learning Area (LLELA) to  
 6 minimize environmental and recreational impact. The borrow areas are shown on Figure 1-2. The borrow  
 7 areas currently reflect the maximum area needed for borrow. It is possible that in the course of project  
 8 design, less borrow would be needed and the disturbed area could be smaller than that considered here.  
 9 For the purposes of this analysis, however, the most impactful condition, i.e., with both borrow pits being  
 10 fully utilized, is considered.

11 Lastly, as part of operations and maintenance, a 50-foot “vegetation clear zone” would be re-established  
 12 along the toe of the embankment. Utility relocations and the access road are being designed to fall within  
 13 the clear zone.

### 14 1.2.8 Habitat Measures

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

22 Planting would be guided by the *Ecosystem-based Vegetation Management Prescriptions for Federally-*  
 23 *owned Land at Grapevine and Lewisville Lakes* (USACE 2004) (“Management Prescriptions”), USACE  
 24 Pollinator Enhancement Plan (USACE 2005) and the *National Strategy to Promote the Health of Honey*  
 25 *Bees and other Pollinators* (Pollinator Health Task Force 2015), and would use native species as  
 26 identified in Table 1-1. Shrubs and trees would be planted at a density of up to 20 shrubs per acre and 20  
 27 trees per acre. Trees and shrubs would be containerized plants up to one- to two-inch diameter at breast  
 28 height (dbh), or one- to two- years old. The tree and shrub species would be planted in mottled to replicate  
 29 savanna-type habitat interspersed with grasslands. The mottes would be planted across the landscape,  
 30 according to their tolerance for hydric conditions, and commercial availability from year to year. Planting  
 31 and subsequent adaptive management, monitoring, and maintenance would be done in partnership with  
 32 LLELA and the USACE-run Lewisville Aquatic Ecosystem Research Facility. It is anticipated that  
 33 adaptive management and monitoring would occur for up to three years after implementation.  
 34 Management of the site could include various management measures including, but not limited to,  
 35 prescribed burns and grazing.

**Table 1-1. Suggested Tree, Shrub, and Grass Plantings**

| <i>Common Name</i> | <i>Scientific Name</i>   | <i>Common Name</i>    | <i>Scientific Name</i>        |
|--------------------|--------------------------|-----------------------|-------------------------------|
| <b>Trees</b>       |                          | <b>Forbs</b>          |                               |
| Pecan              | <i>Carya illinoensis</i> | Azure sage            | <i>Salvia azurea</i>          |
| Black hickory      | <i>Carya texana</i>      | Prairie beard tongue  | <i>Penstemon cobaea</i>       |
| Eastern redbud     | <i>Cercis canadensis</i> | Gayfeather            | <i>Liatris mucronata</i>      |
| Black walnut       | <i>Juglans nigra</i>     | Illinois bundleflower | <i>Desmanthus illinoensis</i> |

**Table 1-1. Suggested Tree, Shrub, and Grass Plantings**

| <i>Common Name</i>   | <i>Scientific Name</i>         | <i>Common Name</i>     | <i>Scientific Name</i>        |
|----------------------|--------------------------------|------------------------|-------------------------------|
| Bur oak              | <i>Quercus macrocarpa</i>      | Purple prairie clover  | <i>Dalea purpurea</i>         |
| Roughleaf dogweed    | <i>Cornus drummondii</i>       | Golden Dalea           | <i>Dalea aurea</i>            |
| Chinkapin oak        | <i>Quercus muehlenbergii</i>   | Texas Star             | <i>Lindheimeria texana</i>    |
| Shumard oak          | <i>Quercus shumardii</i>       | Lance leafed coreopsis | <i>Coreopsis lanceolate</i>   |
| Post oak             | <i>Quercus stellata</i>        | Plains coreopsis       | <i>Coreopsis tinctoria</i>    |
| <b>Shrubs</b>        |                                | Horse mint             | <i>Monarda citriodora</i>     |
| Possumhaw holly      | <i>Ilex decidua</i>            | Black-eyed Susan       | <i>Rudbeckia hirta</i>        |
| Reverchon hawthorn   | <i>Crataegus reverchonii</i>   | Cut-leaf daisy         | <i>Engelmannia peristenia</i> |
| Mexican plum         | <i>Prunus mexicana</i>         | Indian blanket         | <i>Gaillardia puchella</i>    |
| American beautyberry | <i>Caillicarpa americana</i>   | Pale purple coneflower | <i>Echinacea angustifolia</i> |
| <b>Grasses</b>       |                                | Rattlesnake master     | <i>Eryngium yuccafolium</i>   |
| Yellow Indiangrass   | <i>Sorghastrum nutans</i>      | Pink evening primrose  | <i>Oenothera speciosa</i>     |
| Little Bluestem      | <i>Schizachryium scoparium</i> | Green milkweed         | <i>Asclepias viridis</i>      |
| Big Bluestem         | <i>Andropogon gerardii</i>     | Antelopehorn milkweed  | <i>Asclepias asperula</i>     |
| Sideoats grama       | <i>Bouteloua curtipendula</i>  |                        |                               |
| Upland switchgrass   | <i>Panicum virgatum</i>        |                        |                               |
| Eastern Gammagrass   | <i>Tripsacum dactyloides</i>   |                        |                               |

1 These assemblages and planting approaches have been utilized in similar, successful habitat establishment  
 2 projects in the region, including the Lynn Creek West Recreational Development Plan at Joe Pool Lake  
 3 (USACE 2011) and the Cleveland Gibbs Wildlife Management Area at Grapevine Lake (done in  
 4 cooperation with Texas Department of Transportation).

### 5 **1.3 PROJECT AND ACTION AREA**

#### 6 **1.3.1 Location**

7 Lewisville Lake is located in north Texas on the Elm Fork of the Trinity River adjacent to Interstate 35  
 8 East and State Highway 121 within the northeastern portion of the City of Lewisville. Originally  
 9 constructed in the 1920s, with the final phase completed in 1955, the lake was designed for conservation  
 10 storage, flood control, and recreational use. Its construction assisted in preventing seasonal flooding in  
 11 southeastern Denton County and has stimulated land development along the shores of the lake.

12 The project area consists of the Lewisville Dam and spillway, and the USACE-owned property (LLELA)  
 13 downstream of the dam, totaling approximately 3,500 acres, within Denton County, Texas and lying just  
 14 south of Lewisville Lake. The project features within this area include the Lewisville Dam, the spillway,  
 15 and the lake outlet and associated conduit (Figure 1-2). LLELA is managed for education, recreation, and  
 16 ecological restoration by a consortium of organizations lead by the University of North Texas.

17 Construction activities associated with PFMs 2, 4A, 4B, and 8 would occur between Jones Road and  
 18 Lewisville Lake. PFM 6 and PFM 7 would occur at the spillway. The ancillary borrow areas and haul  
 19 routes would occur within LLELA; habitat measures would occur in the borrow areas (Figure 1-2). Only  
 20 291.2 acres of the total project area would be subject to direct impact, and within this action area, 247.9  
 21 acres are terrestrial habitat (savanna, grassland, upland forest, riparian woodland, and wetlands) and 18.2  
 22 acres are aquatic habitat (lacustrine and riverine), both of which have been evaluated for wildlife habitat  
 23 suitability. The remaining 25.1 acres within the action area is “urban” or developed cover type.

### 1 1.3.2 History of Lewisville Lake

2 In the 1920s, the City of Dallas built the Garza Dam on the Elm Fork of the Trinity River to create Lake  
3 Dallas as a municipal water source. The dam was 10,890-feet long with a 587-foot service spillway and a  
4 normal pool elevation of 515 feet above mean sea level (msl). Under the purview of the Rivers and  
5 Harbors Act of 1945, USACE began construction of the Garza-Little Elm Dam in 1948 to meet the water  
6 demands of the growing Dallas community. When completed in 1955, the new dam not only impounded  
7 the waters of the Elm Fork of the Trinity River, as Lake Dallas had, but also Stewart, Panther,  
8 Cottonwood, Doe Branch, Little Elm, Pecan and Hickory Creeks. The dam and the lake were later  
9 renamed for the city in which they were located, Lewisville. The dam is constructed of compacted soil  
10 and is 32,888-feet long with a 560-foot spillway at the eastern end of the dam and a conservation pool  
11 elevation of 522-feet above msl, and normal flood pool at 537-feet above msl. Gates are located at the  
12 opening to conduits to allow controlled releases of water downstream.

### 13 1.3.3 Climate, Topography, and Ecology

14 The climate of Denton County is humid subtropical with hot summers and cool winters, with an  
15 occasional front of extremely cold temperatures. The average low and high temperatures range from 33  
16 degree Fahrenheit (°F) in January to 96°F in July. The lowest minimum recorded temperature is -3°F in  
17 1930 and 1949, and the highest maximum is 113°F in 1954. Annual precipitation within Lewisville  
18 averages 29.3 inches per year. The terrain consists of rolling hills generally sloping to the east and  
19 southeast. Lewisville is situated 709 feet above msl.

20 The project area is located in the mostly in the Blackland Prairie eco-region, with some remnants of the  
21 Cross Timber ecoregion at the project site. The lake lies on the edge of both ecoregions. Blackland  
22 Prairie ecological area of Texas (Gould 1962) and is within the identically-named Blackland Prairie  
23 natural vegetation area (Diggs et al. 1999). Historically, the area was predominantly tall grass prairie with  
24 trees along watercourses, sometimes scattered on the prairie or concentrated in certain areas possibly as a  
25 result of locally favorable soil conditions or topography. Fire was probably an important factor in  
26 maintenance of the original prairie vegetation and had a major impact on the community structure  
27 (Strickland & Fox 1993). Tall grass prairie fires, intensely hot, would have been stopped only by the lack  
28 of dry fuel or a change in topography. Even stream bank vegetation was susceptible during dry years. The  
29 end result was that trees were rare even along some stream banks, and prairie margins probably extended  
30 somewhat beyond the limits of the soil types usually associated with prairie (Hayward & Yelderman  
31 1991). There is considerable variation in the tall grass prairie communities of the Blackland Prairie  
32 (Diamond & Smeins 1993) and disagreement about specific community types (Simpson & Pease 1995).  
33 However, common dominant grasses of this tall grass prairie ecosystem include little bluestem  
34 (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*),  
35 switchgrass (*Panicum virgatum*), eastern gamagrass (*Tripsacum dactyloides*), tall dropseed (*Sporobolus*  
36 *compositus*), Texas cupgrass (*Eriochloa sericea*), Florida paspalum (*Paspalum floridanum*), and long-  
37 spike tridens (*Tridens strictus*) (Collins et al. 1975). As a whole, most of the Blackland Prairie is a  
38 complex mosaic of tall grass communities (Diggs et al. 1999).

39 With the exception of preserves, small remnants, or native hay meadows, almost nothing remains of the  
40 original Blackland Prairie communities. Conversion of the Blackland Prairie for agriculture was the most  
41 significant cause of the destruction of this ecosystem, with only marginal, steeply sloped land not rapidly  
42 brought under cultivation. High prices for cotton and grains eventually resulted in the cultivation of these

1 areas as well. Once stripped of protective grass, these areas eroded rapidly with disastrous effects. Given  
2 the relatively high rainfall and continuing suppression of fire by humans, pioneer species of native trees  
3 and shrubs (e.g., eastern red cedar [*Juniperus virginiana*] and cedar elm [*Ulmus crassifolia*]), as well as  
4 introduced species, were able to invade and eventually take over areas that were formerly prairie (Diggs  
5 et al. 1999).

6 Soil types within the project area are composed largely of the Trinity-Frio, Eddy-Stephen-Austin, Silawa-  
7 Silstid-Bastil, and Austin-Houston Black representing the Tallgrass Prairie Community of soils  
8 associated with floodplains, stream terraces, and uplands along this portion of the Trinity River  
9 floodplain. This community is characterized by deeper soils underlain at rather shallow depths by dense,  
10 hard, clayey material. This “claypan” restricts air and water movements, as well as root penetration. It is  
11 typically dominated by warm-season, perennial tallgrasses, with warm season, perennial midgrasses  
12 filling most of the remaining species composition. The warm season, perennial forb component varies  
13 between 5 and 15% depending on climatic patterns and local precipitation. Historically, woody species  
14 made up a minor component of the community, 5% or less (USDA 2009). The tree species noted most  
15 often in the Blackland Prairie ecoregions of the project area during data collection were green ash  
16 (*Fraxinus pennsylvanica*), pecan (*Carya illinoensis*), black willow (*Salix nigra*), American elm (*Ulmus*  
17 *americana*), hackberry (*Celtis occidentalis*), cedar elm, red mulberry (*Morus rubra*), and bur oak  
18 (*Quercus macrocarpa*). The Cross Timbers ecoregion portions of the project area are typified by  
19 blackjack oak (*Quercus marilandica*), Shumard oak (*Quercus shumardii*), and black hickory (*Carya*  
20 *texana*). Although past agriculture practices have brought upland characteristics to portions of the project  
21 area, historically more of it was likely dominated by additional riparian woodland forest.

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

39 LLELA is a key resource for regional pollinators. LLELA provides a large, unfragmented landscape  
40 surrounded by intensely developing and urbanizing private land. LLELA’s location adjacent to Interstate  
41 35 makes it particularly important for migrating monarch butterflies. The Interstate 35 corridor is a  
42 priority focus for restoration in the *National Strategy to Promote the Health of Honey Bees and Other*  
43 *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**

| <i>Habitat Type</i> | <i>Species Used</i> |
|---------------------|---------------------|
| 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

1 were analyzed for the riparian woodland. There were nine upland forest variables, twelve wetland  
2 variables, seven grassland habitat variables, and ten savanna variables. These variables were measured or  
3 estimated within a tenth-acre data site within the habitat they represent; they are used as indicators of  
4 habitat condition or value.

5 Baseline habitat conditions are expressed as a numeric function (HSI value) ranging from 0.0 to 1.0,  
6 where 0.0 represents no suitable habitat for an indicator species and 1.0 represents optimum conditions  
7 for the species. HSI values ranging from 0.01 to 0.24 are considered “poor” habitat, 0.25 to 0.49 are  
8 considered “below average” habitat, 0.50 to 0.69 are “average” habitat, 0.70 to 0.89 are “good” habitat,  
9 and 0.90 to 1.00 are considered “excellent” habitat. Habitat Units (HUs) are calculated by multiplying the  
10 HSI for each habitat by the amount of acres of the same habitat. The HSI models for the indicator species  
11 are available in the References, Chapter 6 (USFWS 1982a, 1982b, 1983a, 1983b, 1984, 1985, 1987). A  
12 summary of the approved models is available here:

13 [http://www.nwrc.usgs.gov/wdb/pub/hsi/USGS-BRD-ITR\\_1997-0005.pdf](http://www.nwrc.usgs.gov/wdb/pub/hsi/USGS-BRD-ITR_1997-0005.pdf) (U.S. Geological Survey 1997).

14 The 2014 PAL includes a complete list of plant species observed during the surveys (Appendix A); the  
15 individual site observation sheets that contain a physical description of each site, and a list of plants and  
16 animals observed at the site (Appendix B); and photographs taken in each compass direction from the  
17 center of each survey site (Appendix D).

## 18 **2.2 HABITAT DESCRIPTIONS AND SUITABILITY INDEX VALUES**

19 Five terrestrial wildlife habitat types are present within the project area. These include 302.2 acres of  
20 riparian woodland (8.6 percent [%] of the project area), 1,197.7 acres of upland forest (34.2%), 117.8  
21 acres of wetlands (3.4%), 594.4 acres of grassland (17.0%), and 1,002.4 acres of savanna (28.6%). Also  
22 found on the site are 43.7 acres of lacustrine habitat (1.2% of the project area), 25.0 acres of riverine  
23 habitat (0.7%) and 215.6 acres of urban development (6.2%).

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

31 The following findings and tables contain the HSI for the five habitats per evaluation group per species or  
32 survey site and a summary table of the existing habitat acres, HSIs, and HUs for each habitat type.  
33 Planning recommendations for these habitats are included at the end of this chapter.



## 1 2.2.1 Riparian Woodland

2 Riparian woodlands are typically bottomland hardwoods; however, the action area contains some riparian  
3 woodlands that could be classified as upland previously influenced by streams, which existed before the  
4 construction of the dam. The HEP defines the bottomland hardwood cover type as wetland areas  
5 dominated by deciduous trees, usually along streams, and that are occasionally flooded. In optimum  
6 conditions, this cover type provides food, cover, nesting habitat, and living space to riparian forest  
7 dependent species. Large trees are important as nesting habitat for the fox squirrel, wood duck, and barred  
8 owl, and escape cover for raccoons, wood ducks, and passerines. Large mast producing trees and shrubs  
9 provide food for the fox squirrel. Brush piles and snags provide necessary food, cover, and shelter for  
10 wildlife such as raccoons and passerines. Close proximity to water is important for the wood duck.  
11 Riparian forest habitats are essential in maintaining biodiversity and providing important wildlife travel  
12 corridors.

13 Riparian woodlands make up 8.6% of the project area and 2.6% of the action area, and are primarily  
14 located along the various outflows, some of which no longer permanently contain water since the  
15 completion of the dam. Many of these woodlands are periodically flooded and are predominately  
16 composed of American elm (*Ulmus americana*), hackberry (*Celtis occidentalis*), pecan (*Carya*  
17 *illinoensis*), cedar elm (*Ulmus crassifolia*), black willow (*Salix nigra*), and bur oak (*Quercus*  
18 *macrocarpa*). Other trees species present include eastern red cedar (*Juniperus virginiana*), cottonwood  
19 (*Populus deltoids*), boxelder (*Acer negundo*), red mulberry (*Morus rubra*), and green ash (*Fraxinus*  
20 *pennsylvanica*).

21 Rapid conversion of riparian woodland to upland forest is ongoing, and is marked by differences in  
22 habitat observed between the 2011 PAL and the 2014 PAL. Considering the age of the reservoir (1955), it  
23 is likely that areas along former streambanks may further lose riparian woodland characteristics as old-  
24 growth vegetation matures, dies, and succession of more upland-type vegetation occurs.

25 Data from Sites 9, 56, 61, and 66 of the 2013 HEP were averaged together to estimate the existing  
26 conditions of riparian woodlands in the action area. These locations were chosen due to their proximity to  
27 the edge of the habitat to resemble the likely condition of the riparian habitat found in the action area.  
28 Most of the riparian sites are dominated by overstory trees that are at the lower extent of that which would  
29 be considered optimal (>12 inches dbh); however, old-growth large trees were scattered throughout  
30 former streambank areas.

31 The cover and reproduction requisite was the most limiting factor for fox squirrels in the action area.  
32 There was a very limited number of overstory trees with sufficient dbh for nesting.

33 The food requisites were estimated to be above average or excellent for the downy woodpecker in the  
34 action area. The most limiting factors for barred owl were the minimal number of overstory trees with  
35 sufficient dbh for nesting and the corresponding low percentage of overstory canopy cover.

36 The value of this cover type was poor for the wood duck in the action area due to the low number of  
37 potentially suitable nest cavity trees and the lack of brood and winter cover.

38 The overall HSI value for the riparian woodland is below average at 0.45; the total HUs for the action  
39 area is 3.42 (Table 2-2).

**Table 2-2. Existing HSI and HU Values for Riparian Woodland Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>  |
|--------------------------|-------------|
| Barred Owl               | 0.25        |
| Wood Duck                | 0.04        |
| Downy Woodpecker         | 0.60        |
| Fox Squirrel             | 0.92        |
| <b>HSI Average</b>       | <b>0.45</b> |
| Acres                    | 7.6         |
| <b>Habitat Units</b>     | <b>3.42</b> |

1 The limiting factors for riparian woodland habitat for the action area are listed below.

- 2     • Overstory trees are generally too small to provide nest sites for fox squirrel and barred owl.  
 3     • Minimal nest sites for the wood duck.  
 4     • Minimal winter and brood cover along the banks for the wood duck.

### 5 **2.2.2 Upland Forest**

6 Deciduous forests are upland hardwood areas dominated by trees with a minimum tree canopy cover of  
 7 25%. Upland forests provide food, cover, nesting habitat, and living space to upland forest dependent  
 8 species. Three species were utilized to represent the upland forest guild: barred owl, fox squirrel, and  
 9 downy woodpecker. Large trees are important as nesting habitat for the fox squirrel and barred owl.  
 10 White-tailed deer (*Odocoileus virginianus*), small mammals, turkey (*Meleagris gallopavo*), bobwhite  
 11 quail (*Colinus virginianus*), and many other species of birds utilize these stands for food and/or cover.

12 Upland forest make up 34.2% of the project area and 16.5% of the action area. Cedar elm, eastern red  
 13 cedar, post oak (*Quercus stellata*), and hackberry dominate this cover type. Other tree species associated  
 14 with this forest type include cottonwood, green ash, bois d'arc (*Maclura pomifera*), gum bumelia  
 15 (*Bumelia lanuginosa*), and Chinaberry (*Melia azedarach*). The shrub layer consists of gum bumelia,  
 16 hackberry, cedar elm, post oak, red mulberry, flowering dogwood (*Cornus florida*), coralberry  
 17 (*Symphoricarpos orbiculatus*), western soapberry (*Sapindus saponaria*), and honey locust (*Gleditsia*  
 18 *triacanthos*).

19 Data from Sites 20, 40, 41, 49, 62, 63, and 142 of the 2013 HEP were averaged together to estimate the  
 20 existing conditions of upland forests in the action area. These locations were chosen because they are  
 21 located in the same contiguous upland forest found in and are close in proximity to the action area.

22 The HSI values for each species for this cover type in the action area range from poor for the fox squirrel  
 23 (0.03), below average for the barred owl (0.30), and average for the downy woodpecker (0.57). The most  
 24 limiting factors in this cover type are (1) distance to available grain for fox squirrel, 2) the lack of large  
 25 trees required by the fox squirrel and barred owl, (3) overstory tree minimum dbh required by the barred  
 26 owl, and (4) a lack of snags required by the downy woodpecker.

27 The overall HSI for the upland forest is below average at 0.30; the total HUs for the action area is 14.43  
 28 (Table 2-3).

**Table 2-3. Existing HSI Values for Upland Forest Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>Action Area</i> |
|--------------------------|--------------------|
| Barred Owl               | 0.30               |
| Downy Woodpecker         | 0.57               |
| Fox Squirrel             | 0.03               |
| <b>HSI Average</b>       | <b>0.30</b>        |
| Acres                    | 48.1               |
| <b>Habitat Units</b>     | <b>14.43</b>       |

1 The limiting factors for upland habitat for the action area are listed below.

- 2     • Insufficient access to available grain for fox squirrel.
- 3     • Overstory trees are generally too small to provide nest sites for fox squirrel and barred owl.

#### 4 **2.2.3 Wetland**

5 Wetlands make up only 3.4% of the project area and only 0.1% of the action area. Herbaceous wetlands  
6 are areas dominated by non-woody vegetation. Wetlands provide food and cover for fish, resident and  
7 migratory birds, small mammals, invertebrates, and the predators that feed on these species. Wetlands are  
8 important nesting habitat for wading birds and waterfowl and are comprised primarily of rushes, sedges,  
9 wetland grasses, and aquatic plants located along the edges of water bodies and creeks, and in seasonally  
10 flooded areas. Some of the wetlands evaluated are permanent, but most are likely seasonal.

11 Data from Sites 37, 44, 58 and 71 of the 2013 HEP were used to estimate the existing conditions of  
12 wetland habitat in the action area. The habitat is estimated to be excellent habitat for the wood duck as a  
13 result of ideal brood cover available in the area. The limiting factor for the kingfisher is the water life  
14 requisite. In particular, riffles are absent, shallow waters are insufficient, and water transparency is low.

15 The overall HSI for the wetlands is below average at 0.19; the total HUs for the entire action area is 0.06  
16 (Table 2-4).

**Table 2-4. Existing HSI Values for Wetland Habitat per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>  |
|--------------------------|-------------|
| Wood Duck                | 0.04        |
| Belted Kingfisher        | 0.33        |
| <b>HSI Average</b>       | <b>0.19</b> |
| Acres                    | 0.3         |
| <b>Habitat Units</b>     | <b>0.06</b> |

17 The limiting factors for wetland habitat for the action area are listed below.

- 18     • Lack of riffles, and therefore a lack of nutrient-rich and abundant food sources for the belted  
19 kingfisher.
- 20     • Water is too deep for successful fishing by the belted kingfisher.
- 21     • Water turbidity is too high for successful fishing by the belted kingfisher.

## 1 2.2.4 Grassland

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

6 This cover type makes up 17.0% of the project area, and 26.5% of the action area. Nearly 40% of the  
 7 action area grassland is north of Jones Road and considered “improved grassland” on and adjacent to the  
 8 Lewisville Dam. Improved grasslands have a substantial non-native component, and are frequently mown  
 9 as part of regular operations and maintenance activities. The remaining unmanaged grasslands are fallow  
 10 fields also containing a combination of native and introduced grasses, forbs, and trees. Portions of these  
 11 areas are managed through the LLELA organization for prairie restoration, with activities including  
 12 periodic prescribed burning and native seeding to reduce encroachment by shrubs, trees, and non-native  
 13 species. The grass species found in the data plots were Johnsongrass (*Sorghum halepense*), coastal  
 14 bermuda (*Cynodon dactylon*), little bluestem (*Schizachyrium scoparium*), bushy bluestem (*Andropogon*  
 15 *glomeratus*), Canada wildrye (*Elymus Canadensis*), King Ranch bluestem (*Bothriochloa* sp.), Virginia  
 16 wildrye (*Elymus virginicus*), and Texas wintergrass (*Nassella leucotricha*).

17 Data from Sites 13, 14, 15, 68, 69, and 73 of the 2013 HEP were used to estimate the existing conditions  
 18 of grassland habitat in the action area. These HEP sites were chosen based on their locations within the  
 19 action area. The HSI value for the eastern meadowlark is 0.82 and considered good habitat. With an HSI  
 20 value of 0.13, the grassland habitat is poor habitat for the eastern cottontail, the limiting factor being the  
 21 lack of any kind of canopy closure (tree, shrub, or herbaceous). Without canopy coverage, the habitat is  
 22 assumed to lack the resources needed to provide adequate winter habitat. The overall HSI for the  
 23 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**

| <i>Indicator Species</i> | <i>HSI</i>   |
|--------------------------|--------------|
| Eastern Meadowlark       | 0.82         |
| Eastern Cottontail       | 0.13         |
| <b>HSI Average</b>       | <b>0.48</b>  |
| Acres                    | 77.2         |
| <b>Habitat Units</b>     | <b>37.06</b> |

24 The limiting factor for grassland habitat for the action area is listed below.

- 25 • Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation).

## 26 2.2.5 Savanna

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

1 Savanna makes up 28.6% of the project area and 39.4% of the action area. Unmanaged savannas such as  
 2 those within the action area typically consist of fallow fields also containing a combination of native and  
 3 introduced grasses, forbs, and trees, but the composition is different from those in the short grass areas.  
 4 The grass species found in the data plots were Johnsongrass, little bluestem, Canada wildrye, coastal  
 5 bermuda, sedges (*Carex* sp.) and barnyard grass (*Echinochloa crus-galli*). Tree and shrub species found  
 6 within the savanna sites include green ash, cottonwood, common persimmon (*Diospyros virginiana*),  
 7 American elm, Texas hawthorn (*Crataegus texana*), black willow, cedar elm, pecan, mesquite (*Prosopis*  
 8 *glandulosa*), bumelia, wild plum (*Prunus mexicana*), red oak (*Quercus buckleyi*), honey locust and honey  
 9 mesquite (*Prosopis glandulosa*).

10 Data from Sites 10, 48, 51, 54, 55, and 65 of the 2013 HEP were used to estimate the existing conditions  
 11 of savanna habitat in the action area. These HEP sites were chosen based on their locations within the  
 12 action area. Three indicator species represent the savanna guild: fox squirrel, eastern meadowlark, and  
 13 eastern cottontail. The HSI for this cover type was poor for the fox squirrel (0), below average for the  
 14 eastern meadowlark (0.36), and average eastern cottontail (0.52). The limiting factors for fox squirrel was  
 15 the minimal number of overstory trees with sufficient dbh for nesting and the corresponding low  
 16 percentage of overstory canopy cover. The life requisites for eastern meadowlark were all of an average  
 17 suitability index, but cumulatively contribute to a below average HSI. The limiting factor for the eastern  
 18 cottontail was the lack of any kind of canopy closure (tree, shrub, or herbaceous).

19 The overall HSI for the savanna is below average at 0.29; the total HUs for the entire action area is 33.26  
 20 (Table 2-6).

**Table 2-6. Existing HSI Values for Savanna Habitat  
 per Indicator Species**

| <i>Indicator Species</i> | <i>HSI</i>   |
|--------------------------|--------------|
| Eastern Meadowlark       | 0.36         |
| Eastern Cottontail       | 0.52         |
| Fox Squirrel             | 0            |
| <b>HSI Average</b>       | <b>0.29</b>  |
| Acres                    | 114.7        |
| <b>Habitat Units</b>     | <b>33.26</b> |

21 The limiting factors for savanna habitat for action area are listed below.

- 22 • Overstory trees are generally too small to provide nest sites for fox squirrel.
- 23 • Minimal cover for eastern cottontail (shrub/tree and persistent herbaceous vegetation).

#### 24 **2.2.6 Riverine**

25 Aquatic riverine habitat within the action area includes 0.5 acre of the Elm Fork River adjacent to, and fed  
 26 by, the outlet structure for Lewisville Lake. Aquatic riverine habitat in the Elm Fork exhibits exceptional  
 27 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**

| <i>Sampling Site</i> | <i>IBI</i>  |
|----------------------|-------------|
| 1                    | 0.71        |
| 2                    | 0.75        |
| 3                    | 1.00        |
| 4                    | 0.88        |
| 5                    | 0.98        |
| <b>Average IBI</b>   | <b>0.86</b> |

1 The limiting factors for the IBI included difficulties accessing and properly surveying Sites 1 and 2, such  
 2 as steep banks, undercut banks, and slick substrate. In addition, these sites were lacking riffle habitat,  
 3 which may have impeded the collection of a representative sample of the fish community.

#### 4 **2.2.7 Lacustrine**

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

### 12 **2.3 HABITAT UNITS SUMMARY**

13 Table 2-8 presents a summary of total HUs for each habitat type within the action area. The majority of  
 14 the habitat in the action area is savanna (114.7 acres). Grassland habitat is the second most common  
 15 habitat type with 77.2 acres, and upland forest the third most common habitat type with 48.1 acres.  
 16 However, due to the quality of the habitats, grassland has the highest HUs with 37.06 HU. Wetlands and  
 17 riverine habitats have the lowest HUs (0.06 and 0.43 HUs, respectively) in the action area, largely  
 18 because they have the least amount of acreage (0.3 and 0.5 acres, respectively).

**Table 2-8. Existing Habitat Units per Habitat Type**

| <i>Habitat Types</i> | <i>Baseline HU</i> |
|----------------------|--------------------|
| Riparian Woodland    | 3.42               |
| Upland Forest        | 14.43              |
| Wetland              | 0.06               |
| Grassland            | 37.06              |
| Savanna              | 33.26              |
| Riverine             | 0.43               |
| <b>Total</b>         | <b>88.66</b>       |

## 1   **2.4    THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN**

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

### 9   **2.4.1   Threatened and Endangered Species**

10   Whooping cranes may be encountered in any county in north central Texas during migration. Autumn  
11   migration normally begins in mid-September, with most birds arriving on the wintering grounds at  
12   Aransas National Wildlife Refuge between late October and mid-November. Spring migration occurs  
13   during March and April. Whooping cranes prefer isolated areas away from human activity for feeding and  
14   roosting, with vegetated wetlands and wetlands adjacent to cropland being utilized along the migration  
15   route. Foods consumed usually include frogs, fish, plant tubers, crayfish, insects, and waste grains in  
16   harvested fields. It is possible that whooping cranes may temporarily utilize habitats present within the  
17   project area during their annual migration but an encounter would be a rare occurrence. It is unlikely that  
18   any of the proposed modifications to the floodplain would have an adverse impact on this species.

19   The endangered interior least tern nests in colonies on bare to sparsely vegetated sandbars along rivers  
20   and streams in Texas from May through August. Nesting areas are ephemeral, changing as sandbars form,  
21   move, and become vegetated. Because natural nesting sites have become sparse, interior least terns have  
22   nested in atypical/non-natural areas, which provide similar habitat requirements. For example, one colony  
23   has been nesting for several years at the Southside Wastewater Treatment Plant in Dallas. Non-natural  
24   nesting sites include sandpits, exposed areas near reservoirs, gravel levee roads, dredge islands, gravel  
25   rooftops, and dike-fields. In recent years, terns have been utilizing artificial habitat more frequently  
26   within the Dallas-Fort Worth Metroplex area with small colonies being established in highly developed  
27   areas. During the flood event in 2015 approximately one dozen least terns were attempting to nest on a  
28   flooded road in Westlake Park, approximately eight miles north of the project area. It is unlikely that any  
29   of the proposed modifications to the floodplain would have an adverse impact on this species. Should  
30   least terns arrive at any of the project areas during the breeding season, the USFWS should be notified to  
31   discuss alternative development plans or the need for consultation under Section 7 of the Endangered  
32   Species Act.

### 33   **2.4.2   Birds of Conservation Concern**

34   The bald eagle (*Haliaeetus leucocephalus*), the American peregrine falcon (*Falco peregrinus anatum*),  
35   and the Arctic peregrine falcon (*F. peregrinus tundrius*) were formerly listed in Denton County but were  
36   removed from the federal threatened and endangered species list (effective August 8, 2007, August 25,  
37   1999, and October 5, 1994, respectively). However, bald eagles and peregrine falcons are still afforded  
38   safeguards under the Migratory Bird Treaty Act; the bald eagle is further protected by the Bald and  
39   Golden Eagle Protection Act.

1 We recommend all activities be conducted in accordance with the USFWS's National Bald Eagle  
2 Management Guidelines, which may be accessed at:

3 <http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>.

4 The USFWS published the *Birds of Conservation Concern 2008* (BCC) in December 2008. "The overall  
5 goal of the BCC is to accurately identify the migratory and non-migratory bird species (beyond those  
6 already designated as federally threatened or endangered) that represent our highest conservation  
7 priorities and draw attention to species in need of conservation action." (USFWS 2008)

8 Copies of the *Birds of Conservation Concern 2008* may be obtained by writing to the Chief, Division of  
9 Migratory Bird Management, U.S. Fish and Wildlife Service, 4401 North Fairfax Drive, Mail Stop 4107,  
10 Arlington, VA 22203-1610, ATTN: BCC 2008. It is also available for downloading on the Division of  
11 Migratory Bird Management's web page at:

12 <http://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf>

13 The following are 19 species on the BCC lists that may utilize appropriate habitat types within the general  
14 vicinity of action area:

- 15 • little blue heron (*Egretta caerulea*) – inland marshes and ponds
- 16 • swallow-tailed kite (*Elanoides forficatus*) – riparian forests, upland forests, and wetlands
- 17 • bald eagle (*Haliaeetus leucocephalus*) – mature forests near large bodies of water
- 18 • peregrine falcon (*Falco peregrinus*) – generalist
- 19 • black rail (*Laterallus jamaicensis*) – salt or freshwater marshes, flooded grasslands
- 20 • upland sandpiper (*Bartramia longicauda*) – grasslands
- 21 • long-billed curlew (*Numenius americanus*) – open water, prairies, and savannas
- 22 • Hudsonian godwit (*Limosa haemastica*) – inland marshes
- 23 • buff-breasted sandpiper (*Tryngites subruficollis*) – prairies, margins of lakes
- 24 • red-headed woodpecker (*Melanerpes erythrocephalus*) – woodlands
- 25 • scissor-tailed flycatcher (*Tyrannus forficatus*) – prairies, savannas, and open shrubland
- 26 • loggerhead shrike (*Lanius excubitor*) – open savanna, shrubland
- 27 • Bell's vireo (*Vireo bellii*) – dense thicket
- 28 • Sprague's pipit (*Anthus spragueii*) – short grass prairie
- 29 • Swainson's warbler (*Limnothlypis swainsonii*) – riparian woodland
- 30 • Henslow's sparrow (*Ammodramus henslowii*) – grasslands with scattered shrub
- 31 • Harris' sparrow (*Zonotrichia querula*) – scrub, undergrowth in open woodlands and savanna,  
32 thickets, brushy fields, and hedgerows
- 33 • Smith's longspur (*Calcarius pictus*) – short grassland
- 34 • orchard oriole (*Icterus spurius*) – open woodlands and shrublands, savannas, marsh edges and  
35 lakeshores

36 Because some of these species could potentially utilize appropriate habitats within the action area,  
37 especially as temporary stopover breaks during annual migration, it is recommended that future projects  
38 avoid and/or minimize adverse impacts to intact habitats whenever possible.



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## 1   **2.5   RECOMMENDATIONS**

2   The habitat analysis indicates the following specific measures could be beneficial for the restoration of  
3   natural habitats impacted by activities within the action area.

- 4       1. In borrow areas, salvage topsoil to re-surface at the project completion.
- 5       2. Borrow areas should be graded to minimize the alteration of local hydrology and contoured to  
6       connect to existing surrounding contours to hasten the re-establishment of vegetation following  
7       project completion.
- 8       3. Recommend planting mast producing trees and shrubs in the borrow areas where they are lacking  
9       to improve the canopy cover and food base.
- 10      4. Provide brush and log piles in existing habitats where they are lacking to provide cover for small  
11      mammals.
- 12      5. Create native grasslands, where possible, throughout the project area to replace Bermuda grass  
13      and Johnsongrass.
  - 14          a. Recommend planting native grass and forb species (as identified in Table 1) appropriate  
15          for the soils.
  - 16          b. Plant shrub and tree mottes in savannas, and maintain them to no more than about 10%  
17          canopy cover.
- 18      6. Any mowing schedule that may be developed should promote tall grass growth, but not interfere  
19      with tall-grass nesting birds.
- 20      7. Recommend that the direct, indirect, and cumulative impacts and conservation needs of the *BCC*  
21      *2008* be considered during any restoration or flood control project planning.

## 22   **2.6   SUMMARY**

23   Much of the habitat south of Lewisville Dam is in below average condition. Aside from the wetland  
24   habitat, which is considered average, all other habitats are estimated to be below average or poor quality.  
25   However, there are still some valuable wildlife habitats remaining within the area. The specific habitat  
26   restoration measures recommended in this report could help restore some of the natural habitats and  
27   improve habitat diversity and quality of remaining habitats; therefore, benefitting a variety of resident and  
28   migratory wildlife species.

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# 1 **CHAPTER 3**

## 2 **FUTURE WITHOUT PROJECT CONDITION**

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### 3 **3.1 INTRODUCTION**

4 This chapter describes potential impacts to fish and wildlife habitats under the Future without Project  
5 Condition (FW/OPC), over the next 50 years within the ROI. The FW/OPC presents the estimated future  
6 conditions in the absence of the Proposed Action. The Lewisville Lake Operations Manager indicates that  
7 under the FW/OPC there are no foreseeable future changes to land use classifications (Personal  
8 communication 29 September 2014). The area around the lake is highly urbanized, while future  
9 development will continue the land use changes are expected to be minimal. The project area, habitat  
10 types (riparian woodland, upland forest, wetland, grassland, savanna, riverine, and lacustrine) and action  
11 area from Chapter 2 are used for the FW/OPC evaluation.

### 12 **3.2 CHANGES TO HABITAT ACREAGES UNDER THE FUTURE WITHOUT PROJECT** 13 **CONDITION ALTERNATIVE**

14 Within the project area as a whole, substantial change was observed between the site visits supporting the  
15 2011 PAL and those for the 2014 PAL. The most notable observed change is the substantial drying of  
16 riparian woodland (referred to interchangeably in the 2011 PAL report with bottomland hardwood) into  
17 upland forest currently observed at the site. Within all of LLELA, more than 70% of what had previously  
18 been considered riparian woodland is now considered upland forest. Grassland was also observed to be  
19 developing into savanna, and savanna into upland forest. Overall, upland forest has increased by more  
20 than 700% in the last 8 years.

21 Under the FW/OPC, there is expected to be minimal change in the action area since the Proposed Action  
22 features would not be constructed and material from the borrow sites would not be needed. Climate  
23 change is expected to create warmer (increases in temperature) and drier (decreases in precipitation)  
24 conditions in the region (U.S. Global Change Research Program 2014). The riparian woodland currently  
25 remaining is limited to drainages, and—assuming no major disturbance—is expected to persist with the  
26 support of annual flooding. Tree encroachment observed in the savanna habitat is already somewhat high,  
27 with tree canopy closure at 28%, and this trend is expected to continue, resulting in savanna rapidly  
28 trending towards upland forest. Grasslands are expected to undergo less successional development, as the  
29 improved grasslands would continue in their current operations and maintenance regime. LLELA  
30 organizational treatments of grasslands (including periodic controlled burns to limit shrub encroachment)  
31 are also expected to continue.

32 All habitat types occur in the action area under existing conditions. Table 3-1 presents the predicted  
33 acreages for the habitat types in the action area over the 50 years following Year 0 under the FW/OPC.  
34 No change in the existing habitat is anticipated between existing conditions and Year 0. Since no actions  
35 are expected to take place in the action area under the FW/OPC, habitat change would be driven by  
36 climate change. Trends for changes anticipated over the next 50 years were determined based on observed  
37 changes between the field visits supporting the 2011 PAL and the 2014 PAL, as well as the National  
38 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**

| <i>Habitat Type</i>     | <i>Existing Conditions</i> | <i>Year (acres)</i> |              |              |              |              |              |
|-------------------------|----------------------------|---------------------|--------------|--------------|--------------|--------------|--------------|
|                         |                            | <i>0</i>            | <i>1</i>     | <i>5</i>     | <i>10</i>    | <i>25</i>    | <i>50</i>    |
| 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          |
| <i>Habitat Subtotal</i> | <i>248.4</i>               | <i>248.4</i>        | <i>248.4</i> | <i>248.4</i> | <i>248.4</i> | <i>248.4</i> | <i>248.4</i> |
| Urban Area              | 25.1                       | 25.1                | 25.1         | 25.1         | 25.1         | 25.1         | 25.1         |
| <b>Total</b>            | <b>273.5</b>               | <b>273.5</b>        | <b>273.5</b> | <b>273.5</b> | <b>273.5</b> | <b>273.5</b> | <b>273.5</b> |

*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).

### 1 3.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES

2 Below are HSI, acreage, and HU tables for the habitats within the action area. HSIs in wetland habitats  
3 are expected to increase over the next 50 years due to increased regulations and technological advances to  
4 increase water quality. HUs are determined by multiplying HSI and acreage.

5 Table 3-2 presents the HSIs, acres, and HUs under the FW/OPC alternatives for the habitats found in the  
6 action area over the next 50 years. The habitat in the project area has existed in a partially maintained and  
7 partially natural since the dam was built in 1955; therefore, the HSIs are expected to change very little  
8 over the next 50 years. The quality of riparian woodlands and upland forests is expected to increase over  
9 the next 50 years, as the forested habitats mature and key variables determining suitability of the habitat  
10 improve (e.g., average dbh would continue to increase as trees age). Grasslands would increase slightly,  
11 as ongoing maintenance would improve herbaceous canopy cover, a key variable to eastern meadowlark  
12 habitat. Savanna habitat would also increase in quality, as increasing shrub cover, as it currently observed  
13 to be occurring, would improve habitat for eastern cottontail. Increased shrub cover would also reduce the  
14 quality for the eastern meadowlark, but the gains in the modelling for the eastern cottontail are greater  
15 than the losses projected for the meadowlark. Riverine habitats are expected to improve more gradually  
16 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    |
| <b>Riparian Woodland</b> |                     |       |       |       |       |       |       |
| 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  |
| <b>Upland Forest</b>     |                     |       |       |       |       |       |       |
| 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 |
| <b>Wetland</b>           |                     |       |       |       |       |       |       |
| 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  |
| <b>Grassland</b>         |                     |       |       |       |       |       |       |
| 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 |
| <b>Savanna</b>           |                     |       |       |       |       |       |       |
| 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 |
| <b>Riverine</b>          |                     |       |       |       |       |       |       |
| 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  |

### 1 3.4 HABITAT UNITS SUMMARY

2 As presented in Table 3-3, HUs would change more for some habitats than others in 50 years under the  
3 FW/OPC. Left undisturbed, savannas are anticipated to continue to develop into upland forests, causing a  
4 decrease in savanna HUs and an increase in upland forest HUs. Riverine HUs in the action area would  
5 increase very slightly in 50 years under the FW/OPC due to an increase in the IBI as a result of increased  
6 regulations and technology for improvements to water quality. Grasslands are expected to slightly  
7 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)**

| <i>Habitat</i>    | <i>HUs</i>      |               |               |
|-------------------|-----------------|---------------|---------------|
|                   | <i>Baseline</i> | <i>FW/OPC</i> | <i>Change</i> |
| 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          |
| <b>Total HU</b>   | <b>88.66</b>    | <b>102.78</b> | <b>14.12</b>  |

### 1 3.5 SUMMARY

2 Under the FW/OPC, habitat in the ROI is not expected to be impacted by any projects; therefore, habitat  
3 acreage changes would be driven by a combination of natural successional trends and climate change.  
4 Common aquatic and terrestrial wildlife that occur within the area are likely to continue to occur in the  
5 area after the implementation of the FW/OPC. Riverine flood events under the FW/OPC would continue  
6 to have a variety of impacts, both beneficial and adverse.

# 1 **CHAPTER 4**

## 2 **PROPOSED ACTION ALTERNATIVE**

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### 3 **4.1 INTRODUCTION**

4 This chapter describes potential impacts to fish and wildlife habitats from the implementation of the  
5 Proposed Action Alternative over the next 50 years. The project area habitat types (riparian woodland,  
6 upland forest, wetland, grassland, savanna, lacustrine, and riverine) and action area from Chapter 2 are  
7 used for the evaluation of the Proposed Action Alternative. The impacts to fish and wildlife habitats from  
8 the implementation of the Proposed Action Alternative, including the implementation of the dam safety  
9 modifications, ancillary improvements including access roads and borrow areas, and habitat measures are  
10 described below.

### 11 **4.2 CHANGES TO HABITAT ACREAGES**

12 In Year 0, 291.2 acres of existing habitat would become urban from the implementation of the Proposed  
13 Action Alternative. Immediately after the implementation of the Proposed Action, terrestrial habitat-type  
14 acreage in the project area would decrease by the size of the action area as they will have been impacted  
15 without yet having opportunity to reestablish. The greatest decrease of habitat acreage would be to  
16 savanna habitat, followed by grasslands and upland forest. Wetlands would be the least impacted due to  
17 the minimal amount of wetland habitat found in the action area. Lacustrine and riverine habitat would be  
18 maintained.

#### 19 **4.2.1 Predicted Changes in Habitat Type**

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

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

32 Terrestrial habitat impacted by the maintenance activities that would re-establish the vegetative clear zone  
33 would become grassland. This area would be subject to regular mowing as part of standard operations and  
34 maintenance at Lewisville Dam. The area impacted by this activity includes 0.3 acres of riparian  
35 woodland, 1.4 acres of savanna, and 2.4 acres of upland forest. The vegetation clear zone also includes  
36 23.0 acres of grassland that would continue as grassland and 2.4 acres of urban land that would likewise  
37 be unchanged.

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

#### 6 4.2.2 Detailed Habitat Projections

7 All seven habitat types occur in the action area under existing conditions. Actions in the action area under  
 8 the Proposed Action Alternative include excavation of Borrow Sites A and B for borrow material for  
 9 improvements on the dam, direct impact to transportation routes to and from the borrow sites, as well as  
 10 the conduit replacement and spillway apron improvements. The habitat measures to establish pollinator  
 11 habitat are also included within the action area.

12 Table 4-1 presents the predicted acreages for the habitat types in the action area over the next 50 years  
 13 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**

| <i>Habitat Type</i>     | <i>Existing Conditions</i> | <i>Year (acres)</i> |              |              |              |              |              |
|-------------------------|----------------------------|---------------------|--------------|--------------|--------------|--------------|--------------|
|                         |                            | <i>0</i>            | <i>1</i>     | <i>5</i>     | <i>10</i>    | <i>25</i>    | <i>50</i>    |
| 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          |
| <i>Habitat Subtotal</i> | <i>266.1</i>               | <i>18.2</i>         | <i>254.7</i> | <i>254.7</i> | <i>254.7</i> | <i>254.7</i> | <i>254.7</i> |
| Urban Area              | 25.1                       | 273.0               | 36.5         | 36.5         | 36.5         | 36.5         | 36.5         |
| <b>Total</b>            | <b>291.2</b>               | <b>291.2</b>        | <b>291.2</b> | <b>291.2</b> | <b>291.2</b> | <b>291.2</b> | <b>291.2</b> |

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

21 Riparian woodland impacted by temporary access, staging and stockpiling would be reseeded with native  
 22 grasses and forbs and allowed to develop naturally. While a portion of the grassland habitat is expected to  
 23 convert to savanna, of which a portion will then convert to upland forest, it is doubtful that riparian  
 24 woodland forest would develop. As observed between the 2010 and 2014 field efforts, much of the  
 25 riparian woodland is currently rapidly converting to upland forest. Furthermore, as presented in the 2014  
 26 National Climate Assessment, drier conditions in the region are anticipated to persist, and thus it is  
 27 unlikely that riparian woodland would re-establish in the area within 50 years.



1 **Upland Forest.** The acreage of upland forest habitat under Proposed Action Alternative would be  
2 eliminated from the action area. During the excavation of the action area for borrow material, mature  
3 forest would be removed. The top soil would be retained, however. Following the completion of the  
4 project (Year 0), the area would be bare, but the top soil would be replaced and the area seeded for  
5 grassland. Upland forest impacted by the creation of the vegetative clear zone would be permanently  
6 converted to grassland. Upland forest impacted by the borrow areas would be entirely converted to  
7 savanna by the habitat measures project element.

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

13 **Wetland.** The acreage of wetland habitat under Proposed Action Alternative would be degraded in the  
14 action area during project implementation. Impacts from construction would impair water flow and  
15 quality, and impacts from construction vehicles traversing the area would damage herbaceous vegetation  
16 growth. Following the completion of the project (Year 0), the impacted area would be restored to its  
17 original topography, scarred and seeded to aid in the re-establishment of vegetation. The wetlands within  
18 the action area are general comprised of early colonizing emergent vegetation, such as cattails. The  
19 frequent flooding within the area, combined with the restoration of topography and rapid colonization by  
20 vegetation would contribute to rapid recovery of these systems within one year.

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

28 **Savanna.** The acreage of savanna habitat under Proposed Action Alternative would be eliminated from  
29 the action area. During the excavation of the action area for borrow material, trees, shrubs, and  
30 herbaceous vegetation would be removed. The top soil would be retained, however, and used during the  
31 implementation of the habitat measures project element. At Year 0, the savanna habitat established under  
32 the habitat measures would be seeded and planted with native trees, but would not yet be functioning  
33 savanna habitat. As trees and herbaceous vegetation becomes established, the habitat measures areas  
34 would be actively maintained with integrated pest management and periodic prescribed burning to  
35 maintain a healthy functioning savanna that would support a robust pollinator community.

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

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

5 **Riverine.** The acreage of riverine habitat would be unchanged by the Proposed Action. The habitat has a  
 6 constant, controlled water supply fed directly from the outlet structure for Lewisville Lake.

#### 7 **4.3 HABITAT SUITABILITY INDEXES AND HABITAT UNIT VALUES**

8 HSI values for the Proposed Action Alternative were based on the species models used for the baseline  
 9 assessment (Chapter 2).

10 Table 4-2 presents the Proposed Action Alternative HSIs, acres, and HUs for the action area for riparian  
 11 woodland, upland forest, wetland, grassland, savanna, and riverine habitat over the next 50 years. With  
 12 the implementation of the Proposed Action Alternative, borrow material will be excavated from the action  
 13 area, temporarily disturbing the habitat. Following the implementation of the Proposed Action Alternative  
 14 (years 0, 1, and 5), the upland forest, wetland, grassland, and savanna habitat HSIs would be low because  
 15 the habitats would have just been created and would take time to become established. The riparian  
 16 woodland habitat is not expected to re-establish with predicted drought conditions. The HSIs for upland  
 17 forest, grassland, and savanna habitats are expected to increase over time as vegetation takes root and the  
 18 trees mature. Because the top soil will be replaced, and native seeding and tree planting is proposed,  
 19 habitat quality in 50 years is expected to exceed existing conditions. Wetland HSIs are expected to  
 20 increase over time to attain existing condition levels as the wetlands have a chance to recover and become  
 21 more established.

22 Aquatic riverine IBIs may decrease initially after project completion, as activities at the conduit  
 23 associated with PFM 2 could reduce the amount or quality of shallow riffle-pool habitat found within the  
 24 upstream portion of the study area. Consequently, the existing fish-community structure could be  
 25 temporarily altered or displaced by stream modifications, development, and/or construction activities  
 26 associated with the Proposed Action. However, the maintained water flow at or near current flow levels  
 27 would aid in the rapid recovery of the stream channel. By year 50, the aquatic riverine IBI is expected to  
 28 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    |
| <b>Riparian Woodland</b> |                     |      |      |      |      |      |       |
| 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     |
| <b>Upland Forest</b>     |                     |      |      |      |      |      |       |
| 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    | 1     | 5     | 10    | 25    | 50    |
| <b>Wetland</b>                    |                     |      |       |       |       |       |       |
| 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  |
| <b>Grassland</b>                  |                     |      |       |       |       |       |       |
| 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 |
| <b>Savanna – Habitat Measures</b> |                     |      |       |       |       |       |       |
| 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 |
| <b>Savanna – All Other</b>        |                     |      |       |       |       |       |       |
| 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  |
| <b>Riverine</b>                   |                     |      |       |       |       |       |       |
| 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  |

#### 1 4.4 HABITAT UNITS SUMMARY

2 Overall HUs would increase under the Proposed Action Alternative over the next 50 years. The greatest  
3 increase would be to savanna habitat from increases in quality of that habitat, despite a slight decrease in  
4 acreage in the action area. Grassland and upland forest habitat would also increase in the action area. The  
5 greatest decrease of HUs would be to riparian woodland habitat as it will be eliminated from the action  
6 area and is not expected to recover in 50 years as a result of drought conditions expected for the area.

7 Table 4-3 presents the existing conditions (baseline) and the Proposed Action Alternative (Year 50) HUs  
8 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)**

| <i>Habitat</i>             | <i>HUs</i>      |                        |               |
|----------------------------|-----------------|------------------------|---------------|
|                            | <i>Baseline</i> | <i>Proposed Action</i> | <i>Change</i> |
| 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          |
| <b>Total HU</b>            | <b>88.66</b>    | <b>121.14</b>          | <b>32.48</b>  |

1 **Riparian Woodland.** HUs in the action area would be eliminated from the development of the land for  
 2 borrow material, as well as from the establishment of the vegetative clear zone, and the temporary access,  
 3 staging, and stockpiling areas. While seeding and planting will occur, it is unlikely succession will occur  
 4 at an appropriate rate to restore riparian conditions in the next 50 years given the expected drought  
 5 conditions. After development, the land is expected to convert to grassland, with some succession to  
 6 savanna and upland forest toward Year 50.

7 **Upland Forest.** HUs in the action area are expected to increase in 50 years under the Proposed Action  
 8 Alternative due to an increase in the acreage and quality of upland forest habitat.

9 **Wetland.** HUs in the action area are expected to remain the same under the Proposed Action Alternative.  
 10 Flooding events are expected to continue in the area, thus providing a constant source of water. While  
 11 increased regulations and technological advances to increase water quality will likely occur, any  
 12 improvements in habitat quality expected under the Proposed Action Alternative would be offset by the  
 13 degradation experienced during construction.

14 **Grassland.** HUs in the action area are expected to increase in 50 years under the Proposed Action  
 15 Alternative due to an increase in the acreage and quality of grassland habitat.

16 **Savanna.** HUs in the action area would increase overall. The increase is primarily from the establishment  
 17 and maintenance of savanna habitat by the habitat measures project element. In addition to the established  
 18 savanna habitat, a small percentage of grassland is expected to convert to savanna each year through  
 19 natural successional processes. Similarly, a portion of savanna habitat would convert to upland forest each  
 20 year.

21 It is worth noting that the habitat quality of the habitat measures areas may not be fully measureable with  
 22 the currently accepted HEP models. Species of herbaceous vegetation, such as milkweed species, that are  
 23 vital to major regional pollinator species may be of limited use to fox squirrel, eastern meadowlark, or  
 24 cottontail, but still provide substantial increased to habitat health over all. Use of flowering shrubs further  
 25 provides a food source for pollinators that is not captured in HEP modelling. Furthermore, the tree species  
 26 proposed for planting in the mottes are generally slow growing, and the mottes would likely take more  
 27 than 50 years to reach functional maturity and mast production. Thus, it is likely that habitat values would  
 28 continue to improve for the reference species beyond 50 years, in addition to continuing to provide an  
 29 oasis of quality pollinator habitat in a highly developed region. Lastly, proposed grading and contouring  
 30 of the area would have the potential to also improve the diversity of plant species that would succeed in

1 the area used for habitat measures, creating a savanna more resilient to changing environmental  
2 conditions.

3 **Aquatic Riverine.** HUs in the action area are expected to remain the same under the Proposed Action  
4 Alternative. Flooding events are expected to continue in the area, thus providing a constant source of  
5 water and restocking of fauna. While increased regulations and technological advances to increase water  
6 quality will likely occur, any improvements in habitat quality expected under the Proposed Action  
7 Alternative would be offset by the degradation experienced during construction

#### 8 **4.5 THREATENED AND ENDANGERED SPECIES AND BIRDS OF CONSERVATION CONCERN**

9 The potential for threatened or endangered species, or BCC within the study area under the Proposed  
10 Action Alternative is anticipated to be the same as that under the FW/OPC; refer to Section 3.5.

11 The Proposed Action Alternative would create higher habitat values than both those of the existing  
12 conditions and those predicted under the FW/OPC. However, as under the FW/OPC, federally-listed  
13 species are not likely to breed or establish permanent residences in the project area under the Proposed  
14 Action Alternative.

#### 15 **4.6 CUMULATIVE IMPACTS**

16 There are no additional projects expected to occur within the ROI. Therefore, no additional impacts to  
17 area habitats are expected to occur.

#### 18 **4.7 RECOMMENDATIONS**

19 The planning recommendations for the implementation of the Proposed Action Alternative are the same  
20 as those recommended for the FW/OPC; refer to Section 3.6.

#### 21 **4.8 SUMMARY**

22 Under the Proposed Action Alternative, overall HUs would increase. The greatest increase would be to  
23 savanna, directly resulting from the habitat measures proposed to foster quality habitat able to support  
24 regional pollinator species. This increase in HU stems from an increase in not only acreage, but also  
25 quality of the habitat. Upland forest habitat would also increase. The greatest decrease of HUs would be  
26 to riparian woodland habitat, which would be completely lost with project implementation.

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## 1 CHAPTER 5

### 2 COMPARISON OF ALTERNATIVES

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3 Both the FW/OPC and the Proposed Action Alternative would maintain equal total acreages of habitat;  
 4 however, the assemblages of habitat would be different between the two alternatives. As shown in Table  
 5 5-1, the implementation of the Proposed Action Alternative would maintain substantially more savanna  
 6 than would the FW/OPC (under which much would be allowed to grow into upland forest). Much of this  
 7 difference results from the Proposed Action Alternative resulting in a substantially greater loss of riparian  
 8 woodland as drier conditions combined with the initial removal of habitat would likely completely  
 9 remove riparian woodlands from the action area.

**Table 5-1. Comparison of Habitat Acres at Year 50 within the Action Area**

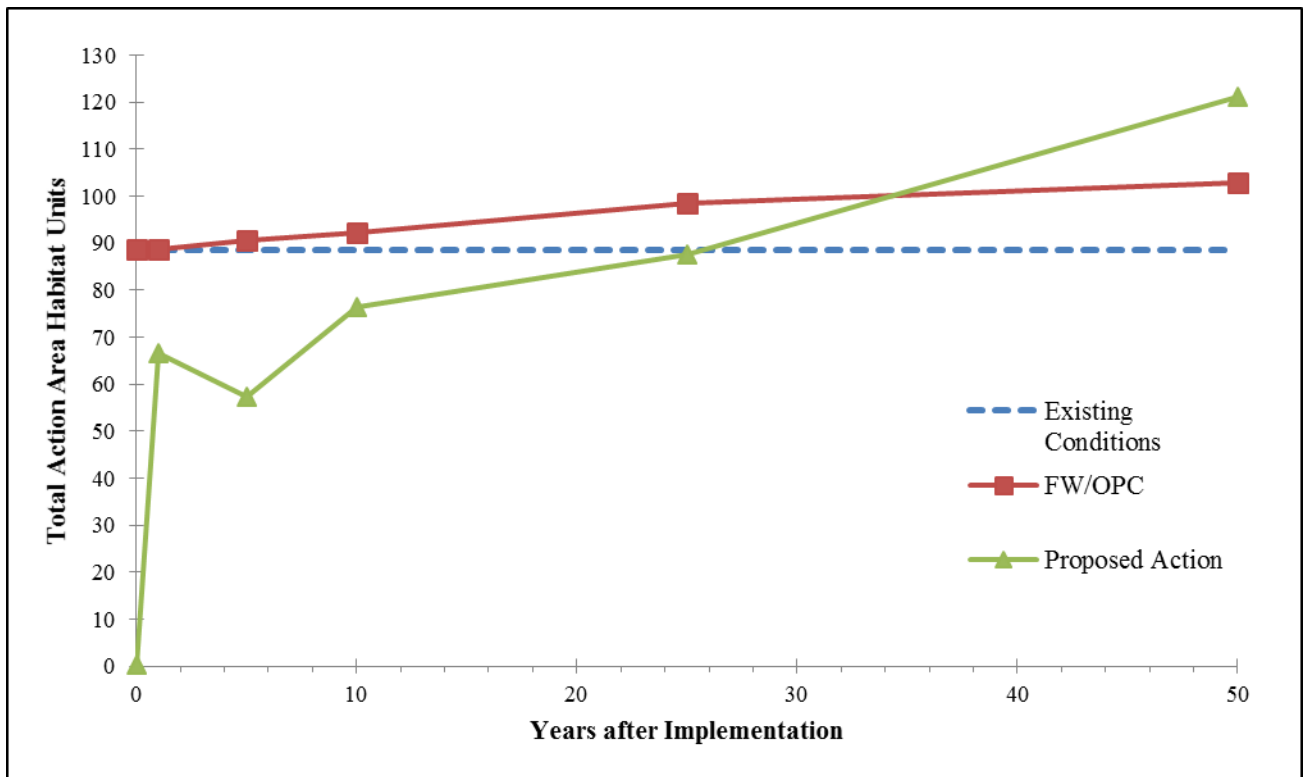
| <i>Habitat Type</i>     | <i>Existing Conditions</i> | <i>FW/OPC</i> |                   | <i>Proposed Action</i> |                   |
|-------------------------|----------------------------|---------------|-------------------|------------------------|-------------------|
|                         | <i>Acres</i>               | <i>Acres</i>  | <i>Difference</i> | <i>Acres</i>           | <i>Difference</i> |
| 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               |
| <i>Habitat Subtotal</i> | <i>266.1</i>               | <i>266.1</i>  | <i>0.0</i>        | <i>254.7</i>           | <i>-11.4</i>      |
| Urban                   | 25.1                       | 25.1          | 0.0               | 36.5                   | 11.4              |
| <b>Total</b>            | <b>291.2</b>               | <b>291.2</b>  | <b>0.0</b>        | <b>291.2</b>           | <b>0.0</b>        |

10 Implementation of the Proposed Action Alternative would immediately and substantially reduce action  
 11 area HUs. However, seeding with native seed and restoring the original topsoil would allow grassland to  
 12 quickly establish. The initial increase at one year followed by a decrease at five years reflects the  
 13 development of moderate quality grassland into lower quality savanna. As the savanna habitat is allowed  
 14 to mature and maintenance continues, the system grows more robust and the total HUs in the action area  
 15 surpass the existing conditions between 30 and 40 years post implementation.

16 One of the primary goals of proposed habitat measures is to establish savanna habitat that supports a  
 17 robust, resilient, and diverse pollinator community. Elements of the habitat measures, such as planting of  
 18 flowering shrubs and choice of specific, pollinator-favored herbaceous vegetation, are not captured by  
 19 HEP modelling, but still provide substantial increased to habitat health over all. Slow-growing tree  
 20 species proposed for planting in the savanna mottes are generally slow growing and would likely take  
 21 more than 50 years to reach functional maturity and mast production. Thus, it is likely that habitat values  
 22 would continue to improve beyond 50 years, in addition to continuing to provide an oasis of quality  
 23 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**





## 1 **CHAPTER 6**

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## **Appendix D**

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### *Clean Water Act Section 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 United States 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 United States (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 U.S. Code [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. The total volume of material to be discharged into open water would be 8,066 cubic yards.

**(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 be 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 PFM 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 temporarily dispersed 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**

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### *Air Quality Analysis*

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## Lewisville Dam Modification Project

| Equipment                                  | Eq-Hrs  | HP   | VOC   |         | NOx   |          | PM10  | PM2.5 | CO2 Metric |
|--|---------|------|-------|---------|-------|----------|-------|-------|------------|
|  |         |      | Tons  | CO Tons | Tons  | SOx Tons | Tons  | Tons  | Tons       |
| <b>Diesel powered</b>                      |         |      |       |         |       |          |       |       |            |
| 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      |
| Generator, 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          |               | NOx           |              | PM10         | PM2.5        | CO2 Metric   |
|---|--------|-----|--------------|---------------|---------------|--------------|--------------|--------------|--------------|
|   |        |     | Tons         | CO Tons       | Tons          | SOx Tons     | Tons         | Tons         | 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       |
|   |        |     | <b>2.321</b> | <b>12.726</b> | <b>19.576</b> | <b>0.289</b> | <b>1.254</b> | <b>1.216</b> | <b>2,850</b> |

| Equipment                             | Eq-Hrs | HP | VOC                 |             | NOx          |              | PM10        | PM2.5       | CO2 Metric  |              |
|---------------------------------------|--------|----|---------------------|-------------|--------------|--------------|-------------|-------------|-------------|--------------|
|                                       |        |    | Tons                | CO Tons     | Tons         | SOx Tons     | Tons        | Tons        | 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       |              |
|                                       |        |    | <b>Subtotal</b>     |             |              |              |             |             |             |              |
|                                       |        |    | <b>Grand Totals</b> | <b>2.56</b> | <b>14.27</b> | <b>23.96</b> | <b>0.29</b> | <b>1.44</b> | <b>1.40</b> | <b>3,306</b> |

| 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<br>Tons  | CO Tons      | NOx<br>Tons  | SOx Tons     | PM10<br>Tons | PM2.5<br>Tons | CO2 Metric<br>Tons |
|---|--------|-----|--------------|--------------|--------------|--------------|--------------|---------------|--------------------|
| <b>Phase 2 Construction</b>                       |        |     |              |              |              |              |              |               |                    |
| 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             |
|   |        |     | <b>0.408</b> | <b>2.593</b> | <b>3.469</b> | <b>0.042</b> | <b>0.231</b> | <b>0.224</b>  | <b>411.632</b>     |

|   | Eq-Hrs | HP | VOC         |             | NOx         |             | PM10        | PM2.5       | CO2 Metric |
|---|--------|----|-------------|-------------|-------------|-------------|-------------|-------------|------------|
|   |        |    | Tons        | CO Tons     | Tons        | SOx Tons    | Tons        | Tons        | 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      |
|   |        |    | <b>0.43</b> | <b>2.80</b> | <b>3.77</b> | <b>0.04</b> | <b>0.24</b> | <b>0.24</b> | <b>456</b> |

| 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) | CO               |                   |              | NOx              |                   |               | PM10              |                    |                     | PM <sub>DF</sub> | PM <sub>TAF</sub> | BSFC <sub>TAF</sub> |                  |
|------------------------------------|------|-------------|----------------|------------------|--------------|------------------|-------------------|--------------|------------------|-------------------|---------------|-------------------|--------------------|---------------------|------------------|-------------------|---------------------|------------------|
|                                    |      |             |                |                  |              | HC <sub>DF</sub> | HC <sub>TAF</sub> | CO (g/hp-hr) | CO <sub>DF</sub> | CO <sub>TAF</sub> | NOx (g/hp-hr) | NOx <sub>DF</sub> | NOx <sub>TAF</sub> | S <sub>PM Adj</sub> |                  |                   |                     | PM <sub>DF</sub> |
| 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             |
| Generator, 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 %  
 $EF_{adj} = EF_{35} * TAF * DF$   
 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               |                   | CO               |                   | NOx               |                    | PM10                |           |       | PM <sub>DF</sub> | PM <sub>TAF</sub> | BSFC <sub>TAF</sub> |      |
|--|------|-------------|----------------|------------------|--------------|------------------|-------------------|------------------|-------------------|-------------------|--------------------|---------------------|-----------|-------|------------------|-------------------|---------------------|------|
|  |      |             |                |                  |              | HC <sub>DF</sub> | HC <sub>TAF</sub> | CO <sub>DF</sub> | CO <sub>TAF</sub> | NOx <sub>DF</sub> | NOx <sub>TAF</sub> | S <sub>PM Adj</sub> | (g/hp-hr) |       |                  |                   |                     |      |
| 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 TC           | 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 tc | 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

Appendix J: Engineering Analysis and Determination of Compliance with Essential Guidelines

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