Lewisville Dam Safety Modification Study

Fort Worth District
Public Meeting

20 August 2013

US Army Corps of Engineers
BUILDING STRONG®

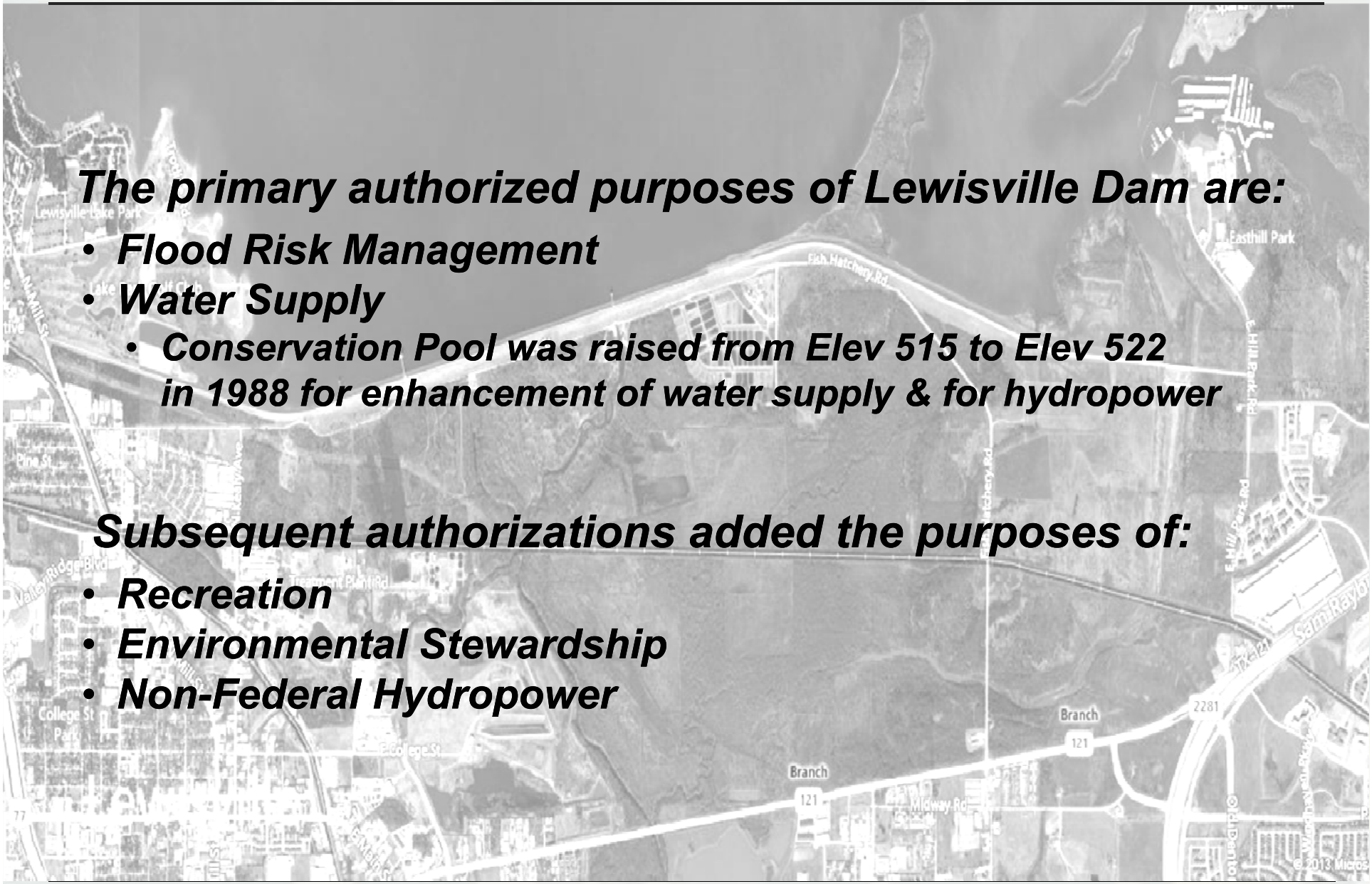
Lewisville Dam - Authorization

Authorized by the River and Harbor Act, approved 2 March 1945

(Public Law 14, 79th Congress, 1st Section)

- ***This law authorized construction of a comprehensive program for the development of the water resources of the Trinity River basin consisting of four multi-purpose lakes (including Lewisville Lake) and two floodway projects.***

Lewisville Dam – Authorized Purposes



The primary authorized purposes of Lewisville Dam are:

- ***Flood Risk Management***
- ***Water Supply***
  - ***Conservation Pool was raised from Elev 515 to Elev 522 in 1988 for enhancement of water supply & for hydropower***

Subsequent authorizations added the purposes of:

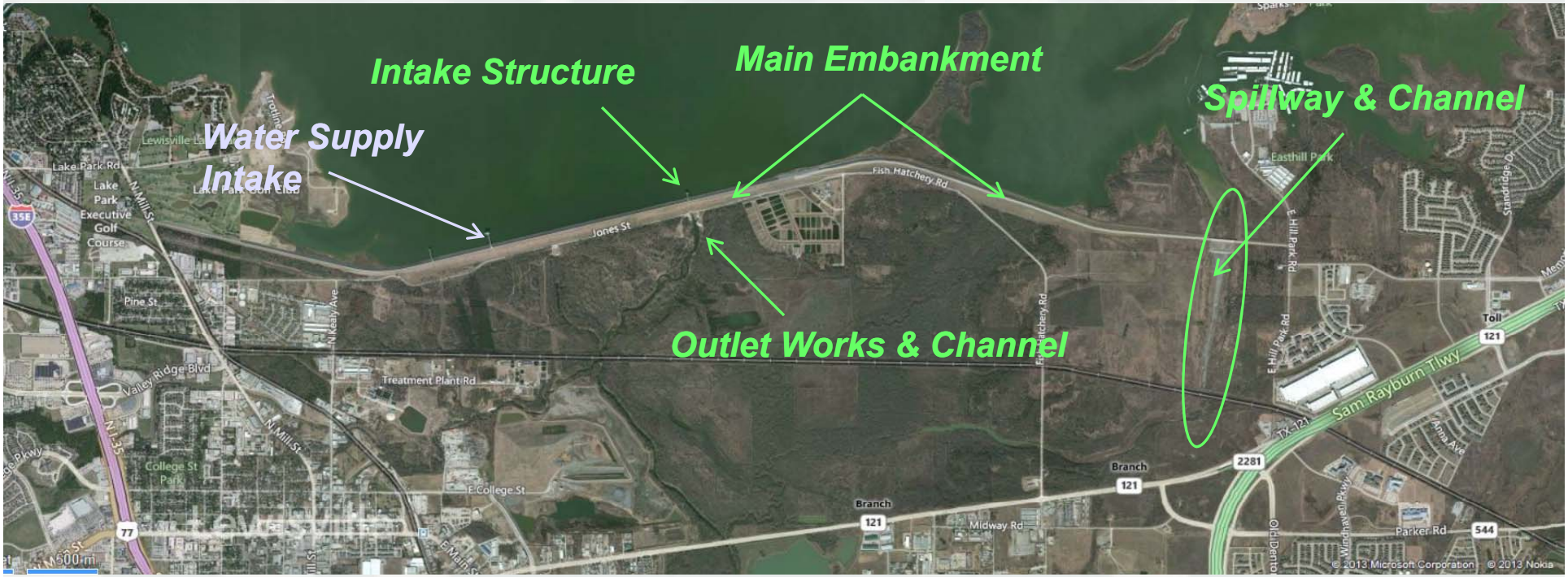
- ***Recreation***
- ***Environmental Stewardship***
- ***Non-Federal Hydropower***

Lewisville Dam - Benefits

Lewisville Dam:

- Has prevented $31.2B in flood damages since completion in 1955
- Provides $725.1M in annual public benefits including water supply, flood damage reduction, recreation & non-federal hydropower
- Provides camping, boating, fishing, swimming & picnicking opportunities for more than 3-million visitors annually

Lewisville Dam – Key Features



EMBANKMENT DETAILS:

- Type: Homogeneous Earth Fill
- Length: 32,328 feet
- Crest Width: 20 feet
- Maximum Height: 125 feet
- Top of Dam Elevation: 560.0

OTHER KEY PROJECT COMPONENTS:

- Intake Structure
- Outlet Works & Channel
- Spillway & Channel
- Water Supply Intake

Lewisville Dam – Major Repair History

Since the project was completed, the following major repairs have been made:

- ***Repair of Riprap (Nov 1966 – May 1967)***
- ***Embankment Modifications***
  - **Upstream Berm (Jul 1979 – May 1980)**
  - **Downstream Berm (May 1981 – Nov 1983)**
  - **Upper Slope Rehabilitation (Jun 1983 - Apr 1984)**
- ***Spillway Repair (Sep 1984 - Sep 1985)***
- ***Spillway Wall & Slab Repair (Oct 1987 - May 1988)***
- ***Upstream Embankment & Erosion Repair (Oct 1995 - Jul 1996)***

Lewisville Dam – Addition of Hydropower

In 1990, the project was modified to add non-federal hydropower facilities.

Lewisville Dam Safety Modification Study

Background, USACE Dam Safety Program:

USACE Dam Safety program is a comprehensive program that has public safety as its primary objective.

--- Life Safety is Paramount ---

Lewisville Dam Safety Modification Study

The USACE Dam Safety Program includes:

- ***Routine project inspections to assess the condition of the project and compliance with operations and maintenance standards.***
- ***Periodic assessment of project performance based on the latest design criterion, evaluation of project performance, and consideration of changes in the project area.***
  - ► **Knowledge associated with safe dam engineering has grown significantly since Lewisville Dam was designed and constructed.**
  - ► **Project performance since construction helps tell us what we need to evaluate.**
  - ► **Land usage around the Lewisville Dam and lake are dramatically different than they were back in the 1950's, so consequences are also different and have increased over time.**

Lewisville Dam Safety Modification Study

As part of the Dam Safety program, in 2004 the US Army Corps of Engineers adopted a risk-informed decision making process for evaluating each of the nearly 700 dams in its portfolio.

- ***Reliability of Structural Features***
- ***Potential Consequences***
- ***Risk = Probability of Failure x Consequences of Failure***

- ***Risk was evaluated in terms of :***
  - **life safety**
  - **economic/property damages**

- ***Aided in identifying & fixing 'the worst first'***

Lewisville Dam Safety Modification Study

Under the Corps' Risk Assessment (RA) process, a preliminary evaluation of Lewisville Dam was performed.

Due to the very significant consequences, Lewisville dam is considered to be very high risk due to possible poor performance associated with uncontrolled seepage through the foundation.

- ***The consequences were considered to be unacceptable due to:***
  - **Densely Populated Urban & Suburban Environment**
  - **Critical Economic Infrastructure**
  - **Environmental Impacts**

Lewisville Dam Safety Modification Study

Under the Corps' Risk Assessment process, a preliminary evaluation of Lewisville Dam was performed …

- ***As a result of the preliminary risk assessment, further analysis and evaluation to confirm safety issues and assess the actual level of risk at Lewisville is ongoing.***
  - **Risk Assessment (more rigorous than the preliminary)**
  - **Dam Safety Modification Study**

Lewisville Dam Safety Modification Study

Under the Risk Assessment, specific areas of concern associated with project performance were identified.

These areas of concern include:

Lewisville Dam - Potential Instability of Spillway Weir

Lewisville Dam – Instability of Spillway Channel

Stability of the spillway channel has been an issue since shortly after it was excavated.

Lewisville Dam – Uncontrolled Seepage

Uncontrolled seepage through the foundation has been observed in several areas.

Lewisville Dam – Potential Embankment Instability

Embankment stability may be an issue due to the types of geologic materials in the embankment and foundation.

Lewisville Dam Safety Modification Study

Dam Safety Modification Study Purpose:

Identify and recommend a plan that reduces the dam safety risk in the most expeditious and cost-effective way so that the project can safely provide the benefits for which it was authorized.

- ***As the DSMS progresses, we analyze the project under all design load conditions and evaluate performance based on the results.***
- ***Once we understand this, we will develop appropriate ways to correct the problematic areas.***

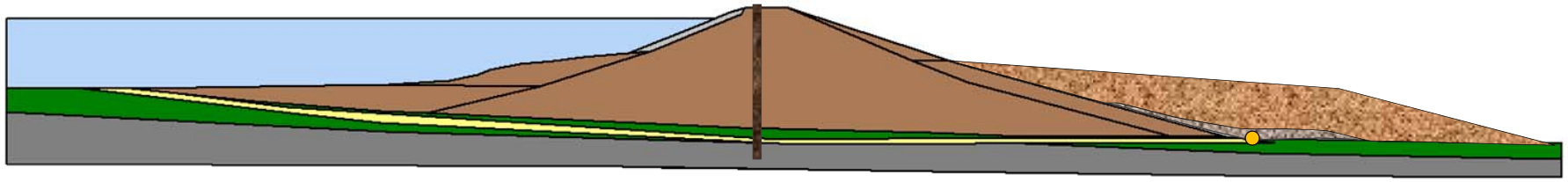
Lewisville Dam reduces risk associated with flood damages, but does not entirely eliminate it.

Lewisville Dam Safety Modification Study

Possible Dam Safety Issues:	Potential Corrective Measures:
▪ Uncontrolled Seepage. Water moving through the foundation could lead to erosion of the embankment	→ *Add filters, toe drains, berms, cutoffs*
▪ Embankment Stability. The embankment may not be stable under higher pool loadings	→ *Stabilize the embankment*
▪ Spillway Stability. The concrete portions of the spillway may not be stable under higher pool loadings	→ *Stabilize the concrete weir*
▪ Spillway Channel Instability. The earthen channel continues to erode	→ *Stabilize the channel slopes*

Lewisville Dam Safety Modification Study

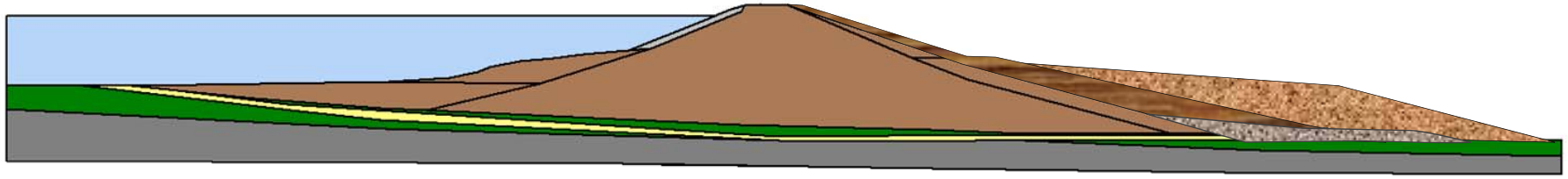
Typical Methods for Correcting Seepage Problems:



- Construct Cutoff Walls
- Incorporate Filters
- Install Toe Drains
- Add Berms
- Combination of any or all the above

Lewisville Dam Safety Modification Study

Commonly Used Methods for Correcting Stability Problems:



- Flatten Slopes & Increase Embankment Cross-Section
- Add Berms
- Incorporate Filters
- Combination of any or all the above

Lewisville Dam - IRRMs

While studies and analyses are ongoing to develop appropriate modifications to the project, Interim Risk Reduction Measures are being implemented in order to address the concerns noted in the preliminary risk assessment.

Completed IRRMs
1. Geophysical Investigations
2. Installation of New Relief Wells
3. Installation of new Piezometers
4. Communication Plan
5. Preposition Emergency Contracts
6. Stockpiling Emergency Materials
7. Emergency Action Plan Update
8. Emergency Exercise
9. Geotechnical Explorations / Evaluation
10. Early Warning System
11. Update Water Control Plan
12. Develop / Obtain Communications System
13. Identify Inspection & Instrumentation/Monitoring Thresholds

Lewisville Dam - IRRMs

Status of remaining IRRMs:

IRRMs in Progress
1. Risk Assessment
2. Inverted Filter Access Road (on-going contract action)
3. Preventative Maintenance and Repairs (on-going)
Other Actions
1. Operational Changes / Pool Restrictions • Changes to allow higher quantity pool releases during flood events have been implemented to reduce hydraulic loads on the embankment • Pool raises are not allowed for high risk dams

Lewisville Dam Safety Modification Study

The region delineated by the yellow line identifies project lands that may potentially be impacted by any future dam safety modifications.

- ***NEPA studies will be undertaken to evaluate the environmental impacts associated with construction of any proposed modifications.***

Lewisville Dam Safety Modification Study

Dam Safety Modification Study Process:

- Identify dam safety issues and opportunities
- Estimate baseline risk condition ← We are here
- Formulate alternative risk management plans
- Evaluate alternative risk management plans
- Compare alternative risk management plans
- Select a risk management plan

Lewisville Dam Safety Modification Study

Required Risk Management Alternatives (ER 1110-2-1156)

- *No Action*
  - Continue Routine Operations and Maintenance
- *Remove Dam*
  - Remove as much of the dam as required to restore the flood plain back to pre-dam condition
- *Replace Dam*
  - Replace existing dam with a project that meets all USACE design standards & criteria

Lewisville Dam Safety Modification Study

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- ***Remediation for Life-Safety Risk Reduction only***
  - **Economic consequences are not considered for this alternative**
- ***Remediate for all Identified Issues***
  - **(Life & Economic Consequences)**
- ***Make Interim Risk Reduction Measures Permanent***

Lewisville Dam - The Bottom Line

- ***Although Lewisville Dam has been identified as very high risk by the US Army Corps of Engineers, it is functioning as designed.***
- ***Dam failure is not likely due to completed "Interim Risk Reduction Measures" coupled with infrequent high reservoir pools***
- ***The Dam Safety Modification Study for long term improvements is underway***
- ***Public safety is our number one priority***

Lewisville Dam Safety Modification Study

EIS Public Scoping Meeting Purpose?

- **National Environmental Policy Act (NEPA)**
- **Advise the general public of the initiation of the study.**
- **Seek input on problems, opportunities, and any environmental concerns in the study area**
- **Answer any questions on the study process**

Lewisville Dam Safety Modification Study

Environmental Impact Statement

The purpose of an EIS is to ultimately help public officials make informed decisions that are a reflection of an understanding of environmental consequences and the alternative available.

An EIS is required to describe:

- **The environmental impacts of the proposed action;**
- **Any adverse environmental impacts that cannot be avoided should the proposal be implemented;**
- **The reasonable alternatives to the proposed action;**
- **The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and**
- **Any irreversible and irretrievable commitments of resources that would be involved in the proposed action should the alternative be implemented.**

Lewisville Dam Safety Modification Study

NEPA Timeline

- Comments within 30 days
- Scoping runs the entire length of the project
- Next meeting will occur around Fall 2015 during the EIS Draft Report stage

Lewisville Dam Safety Modification Study

Targeted DSMS Timeline

- **Spring 2014 - Complete Baseline Risk Assessment**
- **Summer 2015 - Tentatively Selected Plan**
- **Fall 2015 - Draft EIS Report Complete & Public Review**
- **Summer 2016 – Final EIS/ROD**
- **2017-2018 - Construction dependent on funding cycles and USACE dam safety priorities**

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For EIS Related Comments, Contact:

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Slides will be posted at WWW.SWF.USACE.ARMY.MIL following the meeting