MANUALLY-SIGNED

FINAL
SUPPLEMENTAL
WATERSHED PLAN NO. VI &
ENVIRONMENTAL ASSESSMENT
For
Rehabilitation of Floodwater Retarding Structure Nos. 3D, 3E and 5A
of the
EAST FORK ABOVE LAVON WATERSHED
Of the Trinity River Watershed
Collin and Grayson Counties, Texas

PREPARED BY:

U.S. Department of Agriculture
Natural Resources Conservation Service

In Cooperation With:

Collin County Soil and Water Conservation District
Upper Elm-Red Soil and Water Conservation District
Collin County Commissioners Court
City of McKinney, Texas
Grayson County Commissioners Court
City of Van Alstyne, Texas
City of Anna, Texas

JULY 2003

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NUMBER VI

Between the

Collin County Soil and Water Conservation District
Local Organization

Collin County Commissioners Court
Local Organization

City of McKinney
Local Organization

Upper Elm-Red Soil and Water Conservation District
Local Organization

Grayson County Commissioners Court
Local Organization

City of Van Alstyne
Local Organization

City of Anna
Local Organization

(Hereinafter referred to as the Sponsoring Local Organization)

and the

Natural Resources Conservation Service
United States Department of Agriculture
(Hereinafter referred to as the Service)

Whereas, The Watershed Work Plan Agreement for East Fork Above Lavon Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 12th day of September, 1956; and

Whereas, the Supplemental Watershed Work Plan Agreement for East Fork Above Lavon Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 1st day of December 1964; and

Whereas, the Supplemental Watershed Work Plan Agreement No. II for East Fork Above Lavon Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 19th day of September, 1972; and

Whereas, the Supplemental Watershed Work Plan Agreement No. III for East Fork Above Lavon Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 28th day April, 1977; and

Whereas, the Supplemental Watershed Work Plan Agreement No. IV for East Fork Above Lavon Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 28th day of November, 2001; and

Whereas, the Supplemental Watershed Work Plan Agreement No. V for East Fork Above Lavon Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 17th day of September, 2002; and

Whereas, it has become necessary to modify said watershed work plan, as supplemented by modifying Floodwater Retarding Structure (FRS) Nos. 3D, 3E, and 5A to bring them up to current performance and safety standards; and

Whereas, a Supplemental Watershed Work Plan/Environmental Assessment which modifies the Watershed Work Plan as supplemented, for said watershed has been developed through the cooperative efforts of the Sponsoring Local Organization and the Service, which plan is annexed to and made a part of this agreement; and

Whereas, in order to extend the watershed plan for said Floodwater Retarding Structures (FRS) Nos. 3D, 3E and5A beyond their evaluated life, it has become necessary to modify said watershed agreement; and

Whereas, the rehabilitation of said FRS Nos. 3D, 3E, and 5A has been authorized under the authority of Public Law 106-472, the Small Watershed Rehabilitation Amendments of 2000, which amends Public Law 83-566, the Watershed Protection and Flood Prevention Act; and

Now, therefore, the Secretary of Agriculture through the NRCS and the Sponsors hereby agree upon the following modifications of the terms, conditions, and stipulations of said watershed agreement, as supplemented:

(1). Paragraph No. 19 is added to the plan agreement with respect to the Rehabilitation of Floodwater Retarding Structure (FRS) Nos. 3D, 3E, and 5A:

In accordance with the Memorandum of Understanding entered into between the City of McKinney, Texas and the NRCS, the amount of Federal funds that will be made available for the rehabilitation of the three floodwater-retarding structures shall be equal to 65 percent of the total rehabilitation costs but shall not exceed 100 percent of the actual construction costs incurred in the rehabilitation. Other funds will bear the remaining 35 percent of the costs. An amount up to the percentage rate specified may be satisfied by the Sponsoring Local Organization for cost of an element such as engineering, real property acquisition, planning or construction. The decision to, and arrangements for, such action will be negotiated between the sponsors and NRCS and will be included in a project agreement executed immediately before implementation.

NRCS is responsible for the costs of engineering services ($183,140) and project administration ($137,355) it incurs. These costs are not used in the calculation of the Federal cost share and are not included in the Estimated Costs below. The costs of all water mineral, and other resource

rights and all Federal, State, and local permits are not considered part of the total costs of the rehabilitation project and are the responsible of the Sponsors. See Table 2 in Appendix E for a complete distribution of total rehabilitation costs. The percentages of the estimated costs of the project to be paid by the Sponsoring Local Organization and the Service are as follows:

Rehabilitation of	Sponsors	NRCS	Estimated Project Costs
FRS No. 3D	35 %	65 %	$723,420
FRS No. 3E	35 %	65 %	$665,893
FRS No. 5A	35 %	65 %	$1,579,907

(2). Paragraph No. 20 is added to the plan agreement with respect to the operation, maintenance, and replacement of Floodwater Retarding Structure (FRS) Nos. 3D, 3E, and 5A:

The Collin County Soil and Water Conservation District, the Collin County Commissioners Court, and the City of McKinney will be responsible for the operation, maintenance, and any needed replacement of the works of improvement for 75-years following completion of construction by actually performing or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work. The Collin County Commissioners Court has the prime responsibilities for maintenance of FRS Nos. 3D, 3E, and 5A. The City has agreed to assist in the maintenance.

(3). Paragraph No. 21 is added to the plan agreement with respect to applicable Federal flood plain management and flood insurance programs:

The Sponsors agree to participate in and comply with applicable Federal flood plain management and flood insurance programs before construction starts.

The Sponsors and NRCS further agree to all other terms, conditions, and stipulations of said watershed agreement not modified herein.

Upper Elm-Red Soil and Water Conservation District
Local Organization

By C. William Thomas

Title Chairman

Date 8/8/03

The signing of this agreement was authorized by a resolution of the governing body of the Upper Elm-Red Soil and Water Conservation District adopted at a meeting held on 8/8/03

(Secretary, Local Organization)

Grayson County Commissioners Court
Local Organization

By

Title Grayson County Judge

Date 8/18/03

The signing of this agreement was authorized by a resolution of the governing body of the Grayson County Commissioners Court adopted at a meeting held on 8-18-03

Wilma Blackshear Bush
(Secretary, Local Organization) County Clerk

City of Van Alstyne, Texas
Local Organization

By

Title MAYOR

Date 8-13-03

The signing of this agreement was authorized by a resolution of the governing body of the City of Van Alstyne, Texas adopted at a meeting held on Aug. 12, 2003.

Jena A. Brown
(Secretary, Local Organization)

Collin County Soil and Water Conservation District
Local Organization

By _____

Title chairman

Date 8/5/03

The signing of this agreement was authorized by a resolution of the governing body of the Collin County Soil and Water Conservation District adopted at a meeting held on 8/5/03.

_____
(Secretary, Local Organization

City of McKinney, Texas
Local Organization

By _____

Title LAWRENCE W. ROBINSON, CITY MANAGER

Date 8-19-03

The signing of this agreement was authorized by a resolution of the governing body of the City of McKinney, Texas adopted at a meeting held on August 4, 2003.

_____
(Secretary, Local Organization)

Collin County Commissioners Court
Local Organization

By _____

Title County Judge

Date 9/2/03

The signing of this agreement was authorized by a resolution of the governing body of the Collin County Commissioners Court adopted at a meeting held on August 26, 2003.

_____
(Secretary, Local Organization)

City of Anna, Texas
Local Organization

By _____

Title Mayor

Date 8-1-03

The signing of this agreement was authorized by a resolution of the governing body of the City of Anna, Texas adopted at a meeting held on July 29, 2003.

_____
(Secretary, Local Organization)

Natural Resources Conservation Service
United States Department of Agriculture

Approved By _____
NRCS State Conservationist

Date: SEP 2 2 2003

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SUMMARY OF SUPPLEMENTAL PLAN/ENVIRONMENTAL ASSESSMENT

Project name: Floodwater Retarding Structures (FRS) Nos. 3D, 3E, and 5A, East Fork Above Lavon Watershed, Collin County, Texas

Sponsors: Collin County Soil and Water Conservation District, Upper Elm-Red Soil and Water Conservation District, Grayson County Commissioners Court, Collin County Commissioners Court, City of McKinney, City of Anna, and City of Van Alstyne.

Description of recommended plan: The preferred alternative is the Rehabilitation of FRS Nos. 3D, 3E, and 5A(Alternative 3A) to extend the service life of the structures, comply with current performance and safety standards and maintain flood control benefits.

Resource Information:

Size of planning area: 2,227 acres

Prime and important farmland (acres): None

Nnmber of minority farmers: None

Wetlands: About 24.4 acres of open water (Lacustrine) wetland (current pool areas of FRS Nos. 3D, 3E, and 5A).

Endangered species: None

Cultural resources: None known

Problem identification: Urban development since FRS Nos. 3D, 3E, and 5A were constructed has resulted in the dams not meeting current dam safety standards. Failure of the dams would result in significant property damage and potential loss of life. FRS Nos. 3D and 3E were constructed as low hazard dams and FRS No. 5A was constructed as a significant hazard dam. Due to potential damage and loss of life as a result of a dam failure, all three dams are now high hazard dams. All of the City's 74,108 residents as well as visitors who use the streets below the dams and the City's recreational facilities are at risk from a dam failure.

Alternative plans considered: Alternative plans considered are the No Action or Future Without (Controlled Breach of FRS Nos. 3D, 3E, and 5A): Decommission of FRS Nos. 3D, 3E, and 5A (Remove the dams); Alternative No. 3A (Rehabilitation of FRS Nos. 3D, 3E, and 5A to meet current performance and safety standards); and Alternative No. 3B (Rehabilitation of FRS Nos. 3D, 3E, and 5A to meet current performance and safety standards and removal of 9.5 acre feet of sediment from FRS No. 5A).

Brief description of each alternative: The "No Action" (No Federal Involvement) Alternative consists of making the minimum breach in the dams to reduce the hazard of failure. The stream channel through the sediment pools will be reconnected and exposed areas would be re-vegetated. The City of McKinney will construct a new bridge at Hardin Boulevard below FRS No. 3D and do the necessary channel work downstream to stabilize the channels below all three

structures. The Texas Department of Transportation will need to modify bridges and/or culverts on the frontage roads along US Highway 75 below FRS No. 5A.

The Decommission of the Dams Alternative consists of removing of the footprint of the dams and restoring natural conditions. The dams and principal spillways will be removed. The auxiliary spillways will be filled. The stream channel through the sediment pools will be reconnected. The sediment pools will be shaped, landscaped, and re-vegetated. A riparian zone along the stream channels will be restored. The City of McKinney will construct a new bridge at Hardin Boulevard below FRS No. 3D, the Texas Department of Transportation will need to modify bridges and/or culverts on the frontage roads along US Highway 75, and the City will do the necessary channel work downstream to stabilize the channels on all three structures.

Rehabilitation of the Dams Alternative 3A consists of providing additional principal and auxiliary spillway capacity to meet current performance and safety standards and extend the service life for another 75 years or more to maintain flood control benefits.

Rehabilitation of the Dams Alternative 3B consists of providing additional principal and auxiliary spillway capacity to meet current performance and safety standards and extend the service life for another 75 years or more to maintain flood control benefits. It also includes the removal of sediment in the upper end of the sediment pool of 5A and another small pond in the detention pool of 5A to reduce odor and potential problems associated with shallow water.

Project purpose: Flood prevention.

Principal project measure: Rehabilitation of FRS No. 3D, 3E, and 5A.

Project costs:	Federal Funds	Other Funds	Total
	$2,250,485	$1,039,230	$3,289,715

Structural measure: Rehabilitation of FRS Nos. 3D, 3E, and 5A.

Project benefits: The project will benefit all of the City of McKinney's 74,108 residents and visitors by reducing the threat of loss of life and extending the service life of the dams. Economic average annual benefits of the project are derived from assuring the continued performance of the three structures by meeting current performance and safety standards. Benefits are based on continuing protection to the downstream area, maintaining upstream property values, and avoiding projected costs associated with the absence of the structures. Total average annual benefits are estimated to be $397,310, which includes updated original downstream agricultural benefits ($31,400), avoiding devaluation of upstream property values ($226,506), replacement of downstream infrastructure, including modifications to Hardin Boulevard, US Highway 75 bridge replacement and water and sewer line replacement ($137,416) and avoiding damage to downstream recreation facilities and public recreation participation ($1,988).

Other impacts: The aesthetics of the area, the wetland values and the recreational opportunities will be maintained. Current upstream property values will be unaffected. In the absence of the structures, 1,422 nearby properties and 232 undeveloped lots located upstream would experience reduced values.

Land use changes: There will be no land use changes.

Environmental values changed or lost: No compensatory mitigation is planned. Installation of the preferred alternative will remove only a limited amount of woody vegetation. Disturbed areas will be replanted with a mixture of native species including woody species where adapted.

Wetlands: Existing acreages of open water wetlands in sediment pools will be unchanged.

Fisheries: Draining sediment pools will be required during construction and will result in the loss of existing fish populations. It is anticipated that the pools will be restocked.

Cultural resources: None.

Prime farmland: None.

Major conclusions: The beneficial effects of the project exceed the cost and will not result in any significant adverse impacts to the environment.

Areas of controversy: None.

Issues to be resolved: None.

SUPPLEMENTAL
WATERSHED PLAN NO. VI &
ENVIRONMENTAL ASSESSMENT

INTRODUCTION

The East Fork Above Lavon (EFAL) Watershed Plan was prepared in 1956 under the authority of Public Law 78-534, as amended, and has been modified several times to reflect changing conditions. The Plan, as supplemented, provides for application of conservation practices for watershed protection, flood prevention, municipal water, and water-based recreation. The local sponsors of the watershed project are Collin County Soil and Water Conservation District, Upper Elm-Fork Soil and Water Conservation District, Collin County Commissioners Court, the City of Anna, the City of Van Alstyne, Grayson County Commissioners Court, and the City of McKinney. Federal assistance is being provided by the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS).

The watershed, located in Collin and Grayson Counties, Texas, comprised of 224,935 acres (about 351 square miles) is a sub-watershed of the Trinity River Watershed.

Within the EFAL Watershed, major changes in land use from a rural setting to an urban setting has occurred in some parts of the watershed. This land use change has occurred upstream and downstream of Floodwater Retarding Structure (FRS) Nos. 3D, 3E, and 5A of EFAL Watershed that provide flood prevention and other benefits. Improvements constructed below the three dams have significantly increased the potential for loss of life and property damage. The structures do not meet current performance and safety standards for dams in an urban setting.

This Supplemental Watershed Plan and Environmental Assessment is prepared for the rehabilitation of FRS No. 3D, 3E, and 5A. The Watershed Protection and Flood Prevention Act (PL-566) as amended by the Watershed Rehabilitation Amendments of 2000 provides the authority for rehabilitation.

PURPOSE AND NEED

The purposes of the FRS Nos. 3D, 3E, and 5A rehabilitation are to maintain present level of flood control benefits and comply with the current performance and safety standards and to extend the service life of the structures. FRS No. 3D was built in 1958, 3E was built in 1967, and 5A was built in 1958. The structures were constructed in a rural setting that has now become urbanized. There is a need to protect downstream life, properties and infrastructure, reduce the risk of potential loss of life, maintain property values upstream and maintain the urban storm water management system.

PROJECT SETTING

This Supplemental Plan/Environmental Assessment is made for the watershed upstream of the three structures and the downstream area affected by breaches of the existing dam (Appendix C). This area is part of the watershed area of the EFALWatershed. The watershed is located in the Trinity River Basin. A description of the East Fork Above Lavon Watershed and the Trinity River Watershed (Authorized by Public Law 78-534, as amended) can be found in the East Fork Above Lavon Watershed Plan dated August 1956 and the Environmental Impact Statement for the Trinity River Watershed, dated July 1979.

The rehabilitation project area is about 2,227 acres that consists of the drainage area of the three structures plus the area that would be inundated by a breach of the dams in excess of the 100-year flood. The majority of the area is located within the western city limits of the City of McKinney, Collin County, Texas. All of the area is either urbanized or projected to be urbanized within the near future. Land use is residential, commercial, lakes, park and open areas. Average annual rainfall is slightly less than 35 inches and temperatures range from an average high of 96 degrees Fahrenheit in July to an average low of 34 degrees in January. Elevations range from 450 ft. mean sea level (msl) to 700 ft. msl.

The project area lies within the Blackland Prairie Physiographic Area. The topography has moderate relief with well-rounded hills and wide shallow valleys. The stream pattern is well developed. Although generally dendritic, linear segments of channels and valleys occur. Fracture directions in the underlying Austin chalk formation control their trends. Historic sedimentation rates in the region were high, averaging about 1.5 to 2 ac-ft./sq.mi./yr. because of agricultural use of the rich blackland soils. Urbanization will reduce sedimentation rates to 0.6 ac-ft./sq.mi./yr., if proper erosion control measures are implemented enforced during and after development. Erosion and resulting sedimentation rates on land during development are higher than after the land has been developed.

Description of Existing Dams

The Collin County Soil and Water Conservation District built FRS Nos. 3D, 3E, and 5A with assistance from the Natural Resources Conservation Service as part of the EFAL Watershed Project. EFAL Watershed, approved in 1956, provided watershed protection and agricultural flood reduction. The project also provided protection to roads and bridges. There was no planned protection to urban properties. The drainage areas of the floodwater retarding structures were predominantly agriculture (cropland and grassland).

McKinney was a small town with a population of about 10,000 when the original plan was developed. The population of McKinney (present population about 74,108) and the surrounding areas has mushroomed in recent years with continued growth projected. The watershed areas of the three structures are completely developed or projected to be completely developed in the near future.

FRS No. 5A was constructed as a significant hazard dam and FRS Nos. 3D and 3E were constructed as low hazard dams. They were designed to store the sediment expected to

accumulate over a 50-year period and provide floodwater storage. The auxiliary spillway for FRS No. 5A was planned to have less than 2 percent (50-year) chance of functioning in any year and FRS Nos. 3D and 3E were planned to have less than 4 percent (25-year) chance of functioning in any year. There are about 33 acre feet of accumulated sediment in the sediment pool. Sediment has been removed from the sediment pool once. A limited analysis of the sediment did not surface significant levels of contaminants.

FRS No. 3D was constructed in 1958 and has a drainage area of 608 acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is a 17-inch diameter reinforced concrete pipe with an orifice plate restricting flow to 11 cubic feet per second. The maximum height of the dam is 35 feet. The present surface area of the sediment pool is about 9.3 acres. There are about 21 acre feet of accumulated sediment in the sediment pool. The quality of the sediment has not been tested.

FRS No. 3E was constructed in 1967 and has a drainage area of 314 acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is an 18-inch diameter corrugated sheet metal pipe with an orifice plate restricting flow to 8 cubic feet per second. The maximum height of the dam is 32 feet. The present surface area of the sediment pool is about 4.5 acres. There are about 10 acre feet of accumulated sediment in the sediment pool. The quality of the sediment has not been tested.

FRS No. 5A was constructed in 1958 and has a drainage area of 1,210 acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is a 17-inch diameter reinforced concrete pipe with an orifice plate restricting flow to 10 cubic feet per second. The maximum height of the dam is 35 feet. The present surface area of the sediment pool is about 10.6 acres.

FRS Nos. 3D, 3E and 5A continue to function as planned and are an integral part of the City of McKinney's flood and storm water management plans. Investigations indicate that the dams, including the principal spillways are structurally sound and are being maintained properly. A recent sediment survey, completed in 2002, indicates that there is available sediment storage capacity to store the sediment accumulation for the next 85 years in FRS No. 3D, 100 years in FRS No. 3E and 46 years in FRS No. 5A. The City of McKinney has taken a proactive role in controlling development in the area that would be flooded by any dam failures. However, the dams do not meet current performance and safety standards for dams located in an urban area.

The drainage areas of FRS Nos. 3D and 5A are slightly less than the drainage area determined when they were originally constructed. The drainage areas used in this plan were taken from the latest USGS topographic maps.

Geology

Bedrock at FRS Nos. 3D, 3E, and 5A consists of rocks of the Austin group. The chalk is moderately soft to moderately hard, very slightly fractured, slight to moderately weathered, and medium to thick bedded. The bedrock contains clay or shale layers inter-bedded with chalk. At shallow depths clay layers underlying fractured chalk may produce localized perched water tables that cause intermittent hillside seeps.

Known alluvium at the structures consists of silty clay with some sand and gravel. Exposures suggest a complex stratigraphy. A surficial dark brown to black clay of medium to stiff consistency overlies a stiff to very stiff dark brown clay with numerous calcareous concretions. The composition of the deepest alluvial materials is unknown.

Dam Safety

Although the three structures are currently sound, there is always a risk of failure. Potential causes of failure include embankment slope failure, foundation failure, seepage through or under the dams, erosion in the auxiliary spillways and overtopping. The State Dam safety officer has placed a high priority interest in upgrading these dams. Features have been incorporated into the design of the structures to minimize the risk of failure. Inasmuch as the three structures have been in place for a significant period of time and no problem has surfaced, there appears to be little potential for failure from seepage, slope failure or from an unstable condition. An inspection, using a video camera, indicated that all three principal spillways were in good condition. However, the corrugated metal pipe in FRS No. 3E needs to be replaced and flow in the existing principal spillways of FRS Nos. 3D and 5A needs to be restricted to prevent pressure flow.

The most probable causes of a failure of these dams are overtopping of the dam and/or erosion in the auxiliary spillway during a dam breech. The dams have experienced some flow through the auxiliary spillways with little or no damage. An analysis of the potential for overtopping of the dams during passage of the probable maximum flood (PMF) indicated that significant flow in the auxiliary spillways would occur and the dams would overtop if this event occurred. The PMF results from a 6-hour rainfall of 30 inches. Although erosion in the spillway and overtopping of a dam does not always cause failure, it would be the most probable cause of failure of these dams.

Because of the actions of the City of McKinney to restrict development in the floodplain, a breach of the dams would not flood any residents or commercial properties

FRS No. 3D has been identified as a high hazard dam as a result of urban development in the area that will be potentially affected by a breach of the dam and Hardin Boulevard, a major transportation route in the City. According to the City of McKinney approximately 2,000 vehicles per day use this road. Breach studies indicate that Hardin Boulevard would be overtopped by approximately seven feet if the dam failed, resulting in property and infrastructure damages and potential for loss of life. There is also a 30-inch water line and an 18-inch sewer line located immediately downstream of the dam that according to the City would have to be repaired in the event of a breach.

The most likely cause of FRS No. 3D failing would be by overtopping. Studies indicate there is less than 0.2 percent chance of a storm (500-year frequency) occurring in any year that would cause the dam to overtop. However, in the unlikely event that the structure was overtopped and failed the most serious failure would be a breach in the highest point. This would result in a breach hydrograph that has a peak discharge of 34,400 cubic feet per second (cfs).

FRS No. 3E has been identified as a high hazard dam as a result of urban development in the area that will be potentially affected by a breach of the dam. Located downstream of the dam are large complexes of recreation areas, as well as Highway 75 with its frontage roads and bridges. The City on a regular basis uses these soccer, softball, and baseball fields. The soccer complex is used regardless of the weather and could be in use during a flood event. The depth of water from a breech would be about 4.0 feet on the soccer fields.

The most likely cause of FRS No. 3E failing would be by overtopping. Studies indicate there is less than 0.2 percent chance of a storm (500-year frequency) occurring in any year that would cause the dam to overtop. However, in the unlikely event that the structure was overtopped and failed the most serious failure would be a breach in the highest point. This would result in a breach hydrograph that has a peak discharge of 13,800 cubic feet per second (cfs).

FRS No. 5A has been identified as a high hazard dam as a result of urban development in the area and Central Expressway (US Highway 75) that will be affected by a breach of the dam. The east portion or main portion of the dam is across a tributary of Wilson Creek and is immediately upstream of US Highway 75. The east portion of the dam is about 40 feet high. The principal spillway is located in this portion of the dam. The north portion where the auxiliary spillway is located is about 14 feet high. Flow from the auxiliary spillway crosses the golf course of Eldorado Country Club, Valley Creek Trail (street) and flows directly into Wilson Creek upstream of US Highway 75. US Highway 75 is a major transportation route from Dallas north to the Oklahoma border. According to the Texas Department of Transportation approximately 92,000 vehicles per day use this road. A breach of the east or main portion of the dam would pose the most significant risk to loss of life and property damage. Breach studies of this portion of the structure indicate that the US Highway 75 west frontage road would be overtopped by 15.2 feet, the east frontage road would be overtopped by 9.2 feet (Park Central would be overtopped by 3.5 feet, Country Club Drive would be overtopped by 9.2 feet) and the flow would be 1.7 feet below the main highway bridge if the dam failed, resulting in property and infrastructure damages and potential for loss of life. There is a 12-inch water line and there are 18-inch and 24-inch sewer lines located immediately downstream of the dam that, according to the City, would have to be repaired in the event of a breach. Also Country Club Drive is located below the dam and would have damage and potential loss of life.

The most likely cause of FRS No. 5A failing would be by overtopping. Studies indicate there is less than 0.2 percent chance of a storm (500-year frequency) occurring in any year that would cause the dam to overtop. However, in the unlikely event that the structure was overtopped and failed the most serious failure would be a breach in the highest point of the east or main portion of the dam This would result in a breach hydrograph that has a peak discharge of 31,200 cfs. There is a possibility of the north portion of the dam failing but damages would be significantly less. A breach of this portion of the dam would result in a breach hydrograph that has a peak discharge of about 2,500 cfs (does not include the flow from the auxiliary spillway). Flow from this breach would be within the boundaries of the 100-year floodplain within a short distance.

The sponsors are aware of the consequences of a dam failure. The City has restricted development within the area that would be flooded by a breach and has enacted an ordinance requiring that all existing and future floodwater retarding structures in the City limits meet high hazard classification criteria.

Cultural Resources

No prior cultural resources identification activities have taken place in association with the original three projects. FRS Nos. 3D, 3E, and 5A were completed in 1958, 1967, and 1958 respectively, which was prior to the implementation of the National Historic Preservation Act and other historic preservation laws that now require NRCS (formerly the Soil Conservation Service) to consider effects to significant cultural resources.

A search of the Texas Archeological Sites Atlas, completed in February 2003, did not reveal any recorded archeological or historic sites in the vicinity of the dam or reservoir at FRS Nos. 3D, 3E, and 5A.

A search of the Native American Consultation Database was conducted to determine if there were any Indian tribes that might attach religious or cultural significance to historic properties that could be located in the proposed project area. This was done in accordance with 36 CFR 800.2 (c)(i) of the Advisory Council on Historic Preservation Regulations. No tribes listed land area claims that included Collin County, Texas.

As the dam rehabilitation program is a federally assisted undertaking, NRCS requested, in a letter dated February 25, 2002, the input of the State Historic Preservation Officer (SHPO) toward meeting its responsibility of considering effects to historic properties that may be affected by specific projects and the rehabilitation program as a whole (letter on file). NRCS proposed to complete a cultural resources survey on all areas of new disturbance associated with proposed rehabilitation projects. By reply letter dated March 19, 2002, the SHPO concurred in the NRCS proposed approach for cultural resources consideration (letter on file).

The cultural resources survey of areas to be disturbed by proposed rehabilitation projects at FRS Nos. 3D, 3E, and 5A was completed in March 2003. The NRCS has determined pursuant to 36 CFR 800.4(d) that there are no properties included in or eligible for the National Register of Historic Places within the area of potential effect of proposed rehabilitation measures. A report of findings and determinations was sent to the Texas SHPO on March 28, 2003 for review (letter on file). The Texas SHPO concurred in the determinations in a reply dated April 22, 2003 (letter on file).

Prime Farmland

There is no prime farmland located in the project area. The Farmland Protection Policy Act of 1981, as amended, states in 7 CFR 658.2, "farmland does not include land already in or committed to urban development or water storage." Inasmuch as all of the project area is committed to urban development or water storage, there is no prime farmland located in the project area.

Threatened and Endangered Species

Data provided by the US Fish and Wildlife service indicates that Collin County is within the range of the endangered whooping crane (Grus Americanus) and the threatened bald eagle (Haliaeetus leucocephalus). FRS Nos. 3D, 3E, and 5A do not provide critical habitat for either of these species. Bald Eagles are often associated with man-made reservoirs in Texas. These reservoirs are usually large structures that provide several thousand acres of open water feeding areas and are associated with tall trees. The limited extent of open water and the urban location of the FWS in the project area reduces the potential of the structures as eagle habitat. There is no documented use of the structures by Bald Eagles. There will be no reduction in the amount of open water and losses of tall trees will be confined to a small area downstream from site 5A.

Wetlands

Construction of FRS Nos. 3D, 3E, and 5A created 24.4 acres of open water (Lacustrine) wetland. (*) Lacustrine wetlands are systems that consist principally of open water areas in excess of 20 acres in size or that have water depths exceeding 6.6 feet at the deepest portion of the basin. These systems frequently result from the damming of stream or river channels. They may include deepwater habitats with depths that exceed 6.6 feet. Lacustrine wetlands lack trees, shrubs or persistent emergents with greater than 30% coverage. Constructed depths of the project sites at principal spillway level averaged 7.5 feet. Average depth now is about 5.4 feet due to sedimentation that has occurred since the sites were built. The wetlands created by these sites provide habitat for reptiles, amphibians, waterfowl, and wading birds. Emergent vegetation is confined primarily to shorelines and shallow water areas not exceeding 2 feet in depth. Cattails are the dominant species occurring in the upper reaches of sites 3D and 3E. Emergent aquatic vegetation is limited on site 5A by mowing and golf course activities. Submerged vegetation is limited by turbidity and generally occurs in water depths of 4 feet or less.

A palustrine wetland area approximately one acre in size exists below the dam on structure 3D. Palustrine wetland systems are dominated by trees, shrubs, and other emergent plants adapted to hydric conditions. The site is dominated by an overstory of ash and willow.

Private interests above site 5A have constructed two shallow impounded palustrine wetlands. These sites are 2.4 and 1.8 acres in size and had an average depth of about 3 feet when constructed. Sedimentation has reduced depths to less than 1.5 feet at the present time. These impoundments are dominated by submerged and floating aquatic vegetation. Shoreline vegetation is limited by mowing and cultural activities.

(*) Cowardin, L.M., V. Carter, F. C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131pp.

Status of O&M

Collin County is responsible for the maintenance of the three structures. The City of McKinney provides assistance in the operation and maintenance. Inspections of the dams indicated that the dams are being operated and maintained properly. The City has been very proactive in restricting development in the area that would be flooded by a dam failure. The City also is actively working to keep sedimentation and increased flooding from development to a minimum.

PROBLEMS AND OPPORTUNITIES

The basic concern is the safety of FRS Nos. 3D, 3E, and 5A and the potential problems that failure of the dams would cause. The primary objective of the project is to minimize the risk of failure and to assure that the structure will continue to function safely in the future. The structures are an integral part of the City's Flood Plain Management and Storm Water Management Plans. Loss of the structures would require the City to install measures to offset the loss in sediment and floodwater storage capacity.

Consequences of Dam Failure

Although FRS Nos. 3D, 3E and 5A are functioning as originally planned and providing downstream flood protection, there is a possibility of the dams failing from overtopping if a storm occurs greater than the structures were constructed to control. The Section on Dam Safety describes the damages that would be caused by a failure of each of the dams. If the dams fail Hardin Boulevard would be overtopped by 7 feet and the US Highway 75 west and east frontage roads would be overtopped by approximately 15.2 feet and 9.2 feet respectively. Park Central would be overtopped by 3.5 feet and Country Club Drive would be overtopped by 9.2 feet. Any vehicles on the thoroughfares would be washed downstream and the road surfaces would be damaged. Traffic would be disrupted while the thoroughfares were repaired which would take about 30 to 60 days. The recreational facilities located on the Wilson Creek flood plain would also be flooded.

Dam failure would result in the loss of the sediment pools, 24.4 acres of open water (Lacustrine) wetland that presently provides fish and waterfowl habitat and adds significantly to property values in urban subdivisions. Approximately 13,100 cubic yards of fill material from the dams would be moved downstream clogging stream channels and increasing flooding. Also much of the sediment in the sediment pools (presently 63 acre feet) would move downstream. A limited investigation of sediment in FRS NO. 5A did not indicate the presence of any hazardous contaminants.

In addition, urban development has increased the runoff and has subsequently increased flood discharges from what was experienced when the dams were built. For example the runoff from a 24-hour 100-year frequency rain has increased on an average from 6.1 inches to 6.9 inches. The thirteen existing floodwater-retarding structures have reduced the peak discharge of the 100-year frequency storm from 51,000 cfs to 26,500 cfs in the lower portion of Wilson Creek. Although erosion and resulting sedimentation from developed land is lower than cropland, erosion during development can be significantly higher if not adequately controlled.

There is sufficient capacity in the sediment pools of sites 3D and 3E to assure proper functioning of the floodwater retarding structures for about 85 and 100 years respectively. There is sufficient sediment storage capacity in site 5A for the sediment accumulation projected to occur over the next 46 years. A considerable amount of sediment was removed from site 5A in about 1980. Sediment accumulation in the sediment pools is a serious concern to the local residents. They are very interested in maintaining normal healthy water levels in the sediment pools and improving their value for fish and wildlife. They would prefer for the water depth to be at least an average of 10 feet. They are also concerned about the problems associated with shallow water and excessive aquatic vegetation in the upper end of the sediment pools, especially site 5A.

SCOPE OF ENVIRONMENTAL ASSESSMENT

A scoping process was used to determine the issues significant in defining the problems, and formulating and evaluating alternatives. Scoping included a public meeting, written request for input from state, local and federal agencies, and a coordination meeting with appropriate agencies. A steering committee of sponsors and local citizens was also formed to solicit input. Local property owners were provided a survey form to identify concerns and indicate effects of the sites on their properties.

Table A presents the results of the scoping process.

Table A – Identified Concerns

Economic, social, environmental, and cultural concerns	**Degree of Concern**	**Degree of Significance to Decision Making**	**Remarks**
Dam Safety	High	High	
Human Health & Safety	High	High	
Flood Damages	High	High	
T&E Species	Medium	Medium	No Impact
Cultural Resources	Medium	Medium	No Impact
Prime Farm Lands	Low	Low	None Present
Wetlands	Medium	Medium	
Air Quality	Low	Low	
Water Quality	High	High	
Water Quantity	High	High	
Aesthetics	High	High	
Sedimentation	High	High	
Land Values	High	High	
Fish Habitat	Medium	Medium	
Wildlife Habitat	Medium	Medium	
Recreation	Medium	Medium	
Flood Plain Management Plan	High	High	
Storm Water Management Plan	High	High	

FORMULATION AND COMPARISION OF ALTERNATIVES

Background

FRS Nos. 3D, 3E, and 5A are located in highly developed residential areas and have been identified as high hazard dams because of development within the areas that will be flooded by a breach of the dams. The State Dam safety officer has placed a high priority interest in upgrading these dams. Hardin Boulevard, a major transportation route in the city, is located immediately downstream of site 3D and would be flooded by a breach. A breach of site 3E would flood the backyards of several houses, and an intensively used recreational area on the flood plain of Wilson Creek. A breach of the dam would inundate a soccer field located above US Highway 75 to a depth of 4 feet. Other recreational facilities are planned for the area. A breach of site 5A would inundate a portion of a golf course, the frontage roads of US Highway 75 and Country Club Drive. A breach of the dam would also cause damages to the primary bridge on US Highway 75. Possible loss of life could result from a breach of any of the dams.

The City of McKinney has taken a proactive role in developing and implementing a flood plain management plan and a storm water management plan. The plans include:

- Controlling development in the 100-year flood plain.
- Restricting development in the breach area of low hazard floodwater retarding structures.
- Requiring measures to be installed to prevent increases in peak discharges from storm events.
- Controlling pollutants entering the streams.

The City of McKinney considered the effects of the installed floodwater retarding structures in developing their flood plain management and storm water management plans (storm water ordinances). The McKinney Flood Plain Management Study (Maier, 1988) describes the importance of the floodwater retarding structures in reducing storm peaks and points out that flood peaks will be increased significantly if the structures failed or were not in place. Flood plain maps were developed considering the floodwater retarding structures were in place.

The structures have benefited development in the areas upstream by reducing the cost of development (installing measures by developers to prevent increases in downstream peaks). The structures have also increased the value of the properties located in the surrounding subdivisions by creating water bodies and open areas for the residents. Lots located around the sediment pools are valued higher than other lots in the area. Hiking trails have either been installed or will be installed in the detention pools and are available to the residents. The impoundments provide a pleasing environment as well as habitat for fish and some waterfowl. A portion of a golf course has been built in the detention pool of site 5A and the sediment pool is used as a source of irrigation water. The structures have also reduced downstream peak discharges and flood depths resulting in reduced flood damages.

FORMULATION OF ALTERNATIVES

A wide range of nonstructural and structural measures were considered singly and in combination as alternatives were formulated. Alternatives eligible for financial assistance under The Watershed Protection and Flood Prevention Act (PL83-566) as amended by the Watershed Rehabilitation Amendments of 2000 and alternatives ineligible for financial assistance were developed. To be eligible for federal assistance, an alternative must meet the requirement as contained in Public Law 106-472.

Nonstructural measures included flood plain management, liability insurance, zoning, flood warning systems, flood proofing of properties, installation of storm water detention structures, and relocation of properties out of the breach area and/or flood plain. Structural measures included removal of sediment accumulation, planned breach of the dams, decommissioning (removal), adding larger principal spillways, raising the top of the dams, increasing the capacity of the auxiliary spillways and channel work.

Different project lives as well as periods of analysis ranging from a minimum of 50-years to a maximum of 100-years were considered. The structural components of the structures will last at least 100-years with proper maintenance. Adequate capacity to store the sediment projected to accumulate over the selected project life must be provided or provisions included to periodically removing the accumulated sediment. Floodwater Retarding Structures Nos. 3D, 3E, and 5A presently have sufficient capacity to store the projected sediment accumulation for about 85, 100, and 46 years respectively. In view of this, alternatives to provide a 50-year and 75-year sediment capacity were evaluated for FRS No. 5A. Site limitations and the cost of sediment removal indicated that providing a 100-year life was not practical. Two methods of providing the capacity were considered: 1) removing accumulated sediment, and 2) raising the elevation of the principal spillway. It is estimated that the construction costs would be about $100,000 to remove sufficient sediment to provide for a 50-year life, about $600,000 to provide for a 75-year life, and about $1,100,000 to provide for a 100-year life. To provide for the 50-year and 75-year sediment capacity by raising the elevation of the principal spillway would cost very little because it could be accomplished at the time that a new principal spillway is installed. The estimated cost of removing the sediment assumed that the sediment is not contaminated (hazardous) and can be disposed of at a reasonable cost. A limited investigation did not indicate the presence of any hazardous contaminants. A 100-year life for site 5A could be provided by a combination of removing sediment and raising the elevation of the principal spillway. The estimated cost of removing sufficient sediment to increase the project life from 75-years to 100-years is about $500,000. Due to the cost of removing the additional 28.5 acre feet of sediment and site limitations, this option was eliminated from further consideration. A 75-year project life and period of analysis was selected over a 50-year life project because it could be provided with little additional costs and would provide beneficial effects for a longer period of time.

Raising the elevation of the principal spillway crest of FRS No. 5A is the most cost effective way to provide the needed sediment storage capacity for this site. However, this alternative would not address the problems associated with shallow water due to accumulation of sediment in the upper end of the sediment pool and a pond in the upper portions of the detention pool. Another alternative plan was developed which addresses these problems.

Channel work was determined to be needed as a means to reconnect the stream channels and as a means to stabilize the downstream channel if the dams were removed. Purchasing liability insurance was dropped from consideration because it did not provide an acceptable solution to the loss of life threat. The City of McKinney has already implemented a storm water management plan as well as a flood plain management plan and has restricted development within the breach area. Changes in these plans were incorporated into the alternatives that included removal or breaching of the dams.

It was determined to be impractical to protect, remove or flood proof downstream improvements from a breach of the dams. There is no viable way to protect Hardin Boulevard below site 3D or US Highway 75 frontage roads below site 5A. It was determined that the roads could not be located out of the breach areas and it is cost prohibitive to raise the roads to the needed elevation to pass the breach flow. There are no residences or buildings downstream of the dams that would be flooded if the dams failed from overtopping. The recreational facilities located on the flood plain of Wilson Creek are the type least likely to be damaged by flooding. There is no suitable site to relocate the facilities out of the breach area.

The "Future Without" or "No Action" alternative serves as a baseline to evaluate the other alternatives. It depicts the most probable future conditions in the absence of a federally assisted project. The Collin County Soil and Water Conservation District owns the easements for the dams and is responsible for determining what action to take if the dams are not brought up to current performance and safety standards.

Based on conditions set forth by the "Future Without" baseline, present conditions were developed. The dams do not meet current safety standards for dams in this location and there is a risk of the dams failing from overtopping. An analysis of the dams indicated that the Probable Maximum Flood (PMF) would overtop the dams. Appendix C shows the area that will be flooded if the dams breached during passage of a storm of this magnitude. Failure of the dams would result in significant damage and potential loss of life. Refer to "Description of Existing Dams section." If the dams fail, the Collin County Soil and Water Conservation District (SWCD) would then be liable for the downstream damages as well as detrimental effects to upstream property values. The District considered the following options in deciding the most likely course of action:

- Modify the dams to comply with current safety standards without Federal assistance.
- Take no action and accept the risk of the dams failing sometime in the future.
- Find another sponsor to accept ownership of the dams and the associated risks and responsibilities.
- Breach the dams to eliminate the risk of failure from a catastrophic storm event.

After considering the options, the SWCD decided that their best option in the absence of Federal assistance was to breach the dams and eliminate the risk of the damages from a failure. Accepting the risk of the dam failure was deemed unacceptable and no entity was identified which would accept the responsibility of the present dams.

The following is a description of the alternative plans that were developed:

- **Alternative No. 1 – Future Without or No Action Plan**

  This alternative consists of making a breach in the three dams of sufficient size to safely pass the 100-year flood event. The breach location would necessitate removal of the principal spillway components. The material would be placed in the present easement area. Exposed areas would be vegetated for erosion protection. The upstream and downstream channel would be reconnected. No other work would be performed. This action would necessitate the installation of a new bridge on Hardin Boulevard below FRS No. 3D and the frontage roads on US Highway 75 below FRS No. 5A. In addition, the stream channels below the three dams would need to be protected from erosion. A new flood plain management study would be needed to reflect the change in flooding. The estimated cost of this option is $1,653,700.

- **Alternative No. 2 - Decommission FRS No. 3D, 3E, and 5A**

  This alternative consists of removing the footprint of the three dams. The principal spillway and the earthen embankments would be removed. Material would be placed in the sediment and detention pool and the auxiliary spillways. All exposed areas would be vegetated as needed for erosion protection (21 acres). Riparian vegetation would be established along the streams (20.3 acres). Channel work, including any needed grade stabilization structures, would be installed to reconnect the stream channels through the sediment pools. This action would necessitate the installation of a new bridge on Hardin Boulevard below FRS No. 3D and the frontage roads on US Highway 75. In addition the stream channels below the 3D and 5A dams would need to be protected from erosion. A new flood plain management study would be needed to reflect the change in flooding. The estimated cost of this option is $2,089,700.

- **Alternative No 3A – Rehabilitation of FRS No. 3D, 3E, and 5A (Raise the elevation of principal spillway.)**

  This alternative consists of modifying the structures to meet current performance and safety standards for high hazard dams. This requires adding sufficient additional principal spillway and auxiliary spillway capacity to pass the flow from the Probable Maximum Flood. Raising the elevation of the principal spillway of FRS No. 5A would provide for the additional storage capacity for the projected 75-year sediment accumulation. FRS Nos. 3D and 3E have sufficient sediment storage capacity.

  The following are significant features planned for each of the three structures:

  A. FRS No. 3D

  1. Add a 30-inch hooded inlet principal spillway with impact basin and replace the slide gate valve on the existing principal spillway.
  2. Widen the auxiliary spillway from 60 feet to 135 feet and lower the crest elevation 0.9 feet.
  3. Raise the elevation of the top of dam by 0.5 feet.

B. FRS No. 3E

1. Remove the existing corrugated metal principal spillway and install a new 30-inch diameter standard concrete pipe principal spillway with impact basin.
2. Lower the elevation of the existing 50-foot wide auxiliary spillway 3.6 feet and maintain the width of 50 feet.
3. Raise the elevation of the top of dam by 0.4 feet.

C. FRS No. 5A

1. Widen the auxiliary spillway from the original 100 feet to 400 feet and lower the elevation of crest of the spillway slightly (0.1 feet).
2. Install a 60-inch diameter standard concrete pipe principal spillway with impact basin and release channel. The crest of the spillway would be at the level of the projected 75-year sediment accumulation. To minimize adverse impacts to the golf course the elevation of the lowest ungated outlet would remain the same as the current elevation.
3. Replace the slide gate on the existing principal spillway.
4. Raise the elevation of the top of the dam by 0.5 feet.

The estimated cost of this alternative is $3,289,715.

- **Alternative No. 3B – Rehabilitation of FRS No. 3D, 3E, and 5A (Raise elevation of principal spillway and remove sediment from sediment pool of FRS No. 5A.)**

This alternative consists of modifying the structures to meet current performance and safety standards for high hazard dams. This requires adding sufficient additional principal spillway and auxiliary spillway capacity to pass the flow from the Probable Maximum Flood. FRS Nos. 3D and 3E have sufficient sediment storage capacity for the 75-year project life. Raising the elevation of the principal spillway of FRS No.5A would provide for the projected 75-year sediment accumulation. To reduce odor and associated shallow water problems in the sediment pool of site 5A and a pond in the detention pool, about 9.5 acre feet of accumulated sediment would be removed and the sediment pool reshaped. Periodic removal of sediment would be needed to maintain the depth of water in these areas.

The following are significant features planned for each of the three structures:

A. FRS No. 3D

1. Add a 30-inch hooded inlet principal spillway with impact basin and replace the slide gate valve on the existing principal spillway.
2. Widen the auxiliary spillway from 60 feet to 135 feet and lower the crest elevation 0.9 feet.
3. Raise the elevation of the top of dam by 0.5 feet.

B. FRS No. 3E

1. Remove the existing corrugated metal principal spillway and install a new 30-inch diameter standard concrete pipe principal spillway with impact basin.
2. Lower the elevation of the existing 50-foot wide auxiliary spillway 3.6 feet and maintain the width of 50 feet.
3. Raise the elevation of the top of dam by 0.4 feet.

C. FRS No. 5A

1. Widen the auxiliary spillway from the original 100 feet to 400 feet and lower the elevation of crest of the spillway slightly (0.1 feet).
2. Install a 60-inch diameter standard concrete pipe principal spillway with impact basin and release channel. The crest of the spillway would be at the level of the projected 75-year sediment accumulation. To minimize adverse impacts to the golf course the elevation of the lowest ungated outlet would remain the same as the current elevation.
3. Replace the slide gate on the existing principal spillway.
4. Raise the elevation of the top of the dam by 0.5 feet.
5. In order to reduce the odor and other problems associated with excessive decaying aquatic vegetation in the upper ends of the sediment pool and a small pond located in the detention pool, a total of 9.5 acre feet of sediment would be removed and the pool would be reshaped to deepen the depth of water. The sediment would be excavated from the pools and disposed of by relocating (burying) within the detention pool. The material would be disposed of onsite to minimize problems associated with hauling wet sediment. The proposed disposal site is on the North side of the detention pool. A pit suitable for burying the sediment would be excavated. Excavated material would be disposed of off-site. A cap of topsoil would be placed on the sediment. The disturbed site would be vegetated with suitable species of grasses and trees.

The estimated cost of this alternative is $3,466,144.

EFFECTS OF ALTERNATIVES

The following is a description of the effects that each alternative will have on the economic, social, environmental, and cultural concerns identified during the scoping process determined to be significant to decision making. The present conditions are also described to provide a better understanding of the effects.

Dam Safety

- Present Conditions: Although the dams are structurally safe, there is a threat of failure from overtopping. Breach studies were made to determine the effects of a one time catastrophic breach of the existing dams. The breach of each existing dam was considered to be overtopping of the dam and a breach as wide as the maximum height of the dam as outlined in TR-66. There is a significant potential for loss of life from a failure of the dams.

The breach of FRS No. 3D, with a maximum discharge of 34,400 cfs, would overtop Hardin Boulevard with approximately seven feet of water.

The breach of FRS No. 3E, with a maximum discharge of 13,800 cfs, will flood several large recreation complexes located downstream. The complexes are used extensively on a daily basis including during inclement weather. A failure of the current corrugated metal principal spillway could also cause a breach of the structure.

The breach of FRS No. 5A, with a maximum discharge of 31,200 cfs would overtop US Highway 75, Central Expressway, west frontage road approximately 18.9 feet, the east frontage road 10.3 feet and would be 1.7 feet below the main highway bridge.

- Alternative No. 1: The threat of any of the dams failing would be removed by breaching the dams thereby eliminating any concern for dam safety.

- Alternative No. 2: Decommissioning the dams and removing the footprint would remove the threat of the dams failing. This would eliminate any concern for dam safety.

- Alternative No. 3A: The dams would be brought up to current performance and safety standards and would function as planned into the future. The threat of failure from the PMF storm overtopping the dams would be eliminated.

- Alternative No. 3B: The dams would be brought up to current performance and safety standards and would function as planned into the future. The threat of failure from the PMF storm overtopping the dams would be eliminated.

Human Health & Safety

- Present Conditions: There is a significant threat to human life and safety from dam failure. If the dams breached from overtopping, Hardin Boulevard would be overtopped seven feet. The west frontage road of Central Expressway (US Highway 75) would be overtopped by approximately 15.2 feet and the east frontage road would be overtopped by approximately 9.2 feet. The breach would be 1.7 feet below the main highway bridge. The recreational soccer facilities located on Wilson Creek floodplain would be flooded by 4.0 feet.

- Alternative No. 1: No threat from failure. Potential threat from flooding.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: Reduced threat to human life and safety from a dam failure or flooding.

- Alternative No. 3B: Reduced threat to human life and safety from a dam failure or flooding. Potential problems associated with shallow water in Site 5A would be reduced.

Flood Damages

- Present Conditions: FRS Nos. 3D, 3E and 5A, in conjunction with the other floodwater retarding structures in the Wilson Creek watershed provide significant reduction in flood damages. In the event of a dam failure, flooding would inflict significant damages to property and infrastructure located downstream from the dam.

- Alternative No. 1: Downstream flooding and damages would increase on all except small storms. In order to alleviate flood damages to the roadways and consequential effects to traffic, City officials indicated that modification would be needed to Hardin Boulevard, and the frontage roads of Central Expressway. The downstream channel below each dam would need to be stabilized and a revised flood plain management study would be needed.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: Continued protection from flooding. Threat of a catastrophic breach is diminished. The City would not incur costs of constructing alternative road and highway options.

- Alternative No. 3B: Continued protection from flooding. Threat of a catastrophic breach is diminished. The City would not incur costs of constructing alternative road and highway options.

T&E Species

- Present Conditions: Data provided by the US Fish and Wildlife service indicates that Collin County is within the range of the endangered whooping crane (Grus Americanus) and the threatened bald eagle (Haliaeetus leucocephalus). FRS Nos. 3D, 3E and 5A do not provide critical habitat for any of these species and no impact is projected to occur as a result of any alternative associated with the rehabilitation or modification of the sites.

- Alternative No. 1: See above.

- Alternative No. 2: See above.

- Alternative No. 3A: See above.

- Alternative No. 3B: See above.

Cultural Resources

- Present Conditions: No known cultural resources are being affected.

- Alternative No. 1: There would be potential to affect cultural resources in previously undisturbed areas in areas where earth fill from dams is placed and in area of construction of new bridges.

- Alternative No. 2: There is potential to affect cultural resources (should any be present) in previously undisturbed areas where earth fill from dams is placed and in area of construction of new bridges.

- Alternative No. 3A: NRCS has conducted a cultural resources survey of the proposed rehabilitation work areas and no known cultural resources will be affected by this alternative.

- Alternative No. 3B: NRCS has conducted a cultural resources survey of the proposed rehabilitation work areas and no known cultural resources will be affected by this alternative.

Wetlands

- Present Conditions: FRS Nos. 3D, 3E, and 5A provide about 24.4 acres of (Lacustrine) water wetlands. Emergent and submerged vegetation occurs on and along shorelines in shallow water areas. Existing emergent vegetation in the upper reaches of sites 3D and 3E is dominated by cattails and other low value species. Aquatic vegetation is limited due to turbidity and occurs at depths of 4 feet or less. Shoreline vegetation is controlled on site 5A by mowing and golf course activities. The created open water wetland provides habitat for reptiles, amphibians, waterfowl, and wading birds. Stream channels above and below the site are narrow and limited to flow only during periods of moderate to heavy rainfall. Two shallow impounded palustine wetlands, constructed by private interests, exist at the upper portion of FRS No. 5A. These are 2.4 and 1.8 acres in surface area and are presently less than 1.5 feet in depth. They are dominated by submerged and floating aquatic vegetation. Shoreline vegetation is sparse and generally consists of low quality species. Adjacent landowners have expressed a concern about odors that occur due to decaying vegetation during low water periods in the summer months. Decomposition of organic matter in the anaerobic sediment layer produces methane and hydrogen sulfide that are released into the atmosphere.

- Alternative No. 1: Breaching the dams would eliminate the existing 24.4 surface acres of open water with its associated wetland values. The one acre wet area below site 3D will be eliminated if water from the FRS is contributing to its wet condition.

- Alternative No. 2: Same as Alternative No. 1

- Alternative No. 3A: Rehabilitation of the dams would retain the existing wetlands and their associated values for the foreseeable future. Raising of the primary spillway of site 5A provides the opportunity to increase the amount of open water by 3.7 acres sometime in the future. As the structure ages and sedimentation continues the area covered by water would become shallower and reduced in size. This process may result in an increase in emergent vegetation and increased turbidity levels, as wind action would be more likely to affect bottom sediments. It may be anticipated that due to the urban location and property values homeowners and/or governmental entities would remove sediment in the sites in the future to maintain the open water aspect and associated wetland values. The location of the new principal spillway on site 3D as originally located would have impacted the wetland area

downstream of the dam. The location of the new principal spillway is now planned to the west of the original spillway to avoid impacting this wetland area.

- Alternative No. 3B: Same as Alternative No. 3A with one exception. Removal of sediment from the upper end of the sediment pool and an upstream pond would increase the depth of water. Shoreline shaping and plantings of native species having food and cover value for species associated with wetlands would be included for areas disturbed by construction. The Palustrine wetland characteristics of the site would be retained and the quality of vegetation for wildlife species would be enhanced by the addition of adapted plants having value for food and cover.

Air Quality

- Present Conditions: Air Quality in the project area is not projected to be impacted by project actions. No air quality problems have been specifically identified and impacts would be of a temporary nature associated with earthmoving and other construction activities. Impacts would be minor for all alternatives.

- Alternative No. 1: Change only during construction activities and until re-vegetated.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: Same as Alternative No. 1.

- Alternative No. 3B: Same as Alternative No. 1.

Water Quality

- Present Conditions: Data on the quality of runoff and in the sediment pools is limited. Limited testing of the sediment in FRS NO. 5A did not indicate any significant levels of contaminants. There is a potential of pollutants from the urbanized areas being carried in the runoff. Also organic material and sediment deposited in the sediment pools is affects the quality of the water.

- Alternative No. 1: Sediment in stream flow would be carried downstream where it would be deposited in the stream channels, and eventually in Lake Lavon..

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: About 169 acre-feet of sediment would be trapped in the sediment pools during the project life. Storm Water Pollution Prevention Plan (SWPPP) required under the NPDES (EPA) Region 6 Storm Water Construction General Permit would minimize any degradation of water quality during construction.

- Alternative No. 3B: Same as Alternative No. 3A. The removal of the sediment would provide additional storage capacity for sediment in FRS No. 5A.

Water Quantity

- Present Conditions: The average annual rainfall is approximately 41 inches. The streams are intermittent. The sediment pools of the three structures and two ponds in the drainage area of FRS No. 5A presently provide about 280 acre-feet of capacity which is presently holding water. Eventually the pools will fill with sediment.

- Alternative No. 1: The capacity to store water in the sediment pools would be eliminated. Flow would move downstream adding to volume and peaks as it moves.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: Same as Present Condition.

- Alternative No. 3B: Same as Present Condition for FRS Nos. 3D and 3E. The removal of sediment in FRS No. 5A would increase the amount of water stored by about 9.5 acre-feet.

Aesthetics

- Present Conditions: The presence of three impoundments covering about 24.4 acres with their associated open space provide a desirable natural area in an urban setting. The increased value of lots, adjacent to and upstream of the lakes, indicates that many people find the sites to be aesthetically desirable. A survey of landowners indicated that bird watching, nature study, and other activities associated with the structures were important to area residents. The plant communities associated with the sites consists of a diverse mixture of trees, shrubs, grasses and forbs. These plant communities in association with the water areas attract birds and other wildlife species that are viewed by area residents. Landowners have indicated they wish to retain the natural beauty of the area and desire that any modifications be the minimum necessary to achieve the future safety of the structures.

- Alternative No. 1: Breaching the dams would result in the loss of the three lakes and the 24.4 acres of associated wetlands. The aesthetic value of the sites would be reduced. Most residents would consider it unattractive to leave a major portion of the embankments. The present pool areas would quickly become covered with invading plants of limited aesthetic value. The plant community would change to plants of higher successional value in time.

- Alternative No. 2: Removes the three lakes and their associated wetlands and replaces it with a terrestrial (upland) plant community. The dams, spillways, and pool areas would be restructured to reflect the pre-project condition and reestablished to native adapted species. The plant community would mature in time and provide habitat for birds and other species. Aesthetic values associated with the lakes and associated wetlands would be reduced.

- Alternative No. 3A: This alternative would retain the aesthetic values of the lakes and associated wetlands for the foreseeable future. About 3 acres of wooded upland would be affected by construction activities associated with the rehabilitation of the sites. These areas would be reseeded to native species following construction.

- Alternative No. 3B: Same as Alternative No. 3A with one exception. The proposed improvements to the sediment pool of FRS No. 5A and the upstream pond would enhance the aesthetics of the area.

Sedimentation

- Present Conditions: The sediment pools of the three dams presently have about 63 acre-feet of sediment. Sediment was removed from the sediment pool of FRS No. 5A in the 1980's when Eldorado Country Club and Golf Course were built. Sediment was removed from two ponds in the drainage area of FRS No. 5A in late 1996-early 1997. These two ponds have captured sediment that would otherwise have been deposited in FRS No. 5A. Limited testing of the sediment in FRS No. 5A did not indicate the presence of any hazardous contaminants. The projected 75-year sediment accumulation is estimated to be 169 acre-feet.

- Alternative No. 1: The 169 acre feet of sediment that would have been stored in the three structures would move and be deposited on the floodplain and in stream channels and Lake Lavon. Sediment from the present sediment pool would be minimal because it would be protected from erosion.

- Alternative No. 2: Basically same as Alternative No. 1.

- Alternative No. 3A: The structures would store 169 acre feet of sediment over the next 75-years. The capacity to store sediment would be increased in FRS No. 5A.

- Alternative No. 3B: The structures would store 169 acre feet of sediment over the next 75-years. The capacity to store sediment would be increased in FRS No. 5A and would be 9.5 acre feet greater than Alternative 3B.

Land Values

- Present Conditions: There are 1,352 developed properties and 662 undeveloped properties adjacent to FRS Nos. 3D, 3E, and 5A sediment pools. The presence of the sediment pools and associated amenities has been a major factor in the development properties in the subdivisions. The properties located around the sediment pools have values ranging from $236,000 to $921,000. Remaining properties within the subdivisions are valued from $126,000 to $1.2 million. Construction of residences within the subdivisions is proceeding at a rapid rate. Maintenance of upstream property values is dependent upon the presence of the dams.

- Alternative No. 1: There are 146 properties currently valued at $52 million immediately adjacent to the sediment pools. The removal of the dams would cause the value of these properties to be reduced by 5 percent. In addition, property not adjacent to the pools but located within the affected subdivisions (currently 1,361 properties with a market value of $394 million) would experience a 0.5 percent reduction in value. The remaining 507 properties with a market value of $148.8 million would lose 0.375% of their value if the

dams were breached. The effects to fair market value of these properties would see a reduction in value in the absence of the dams.

- Alternative No. 2: The decommissioning of the dams and associated pools will cause a reduction in property values that is the same as Alternative 1.

- Alternative No. 3A: The value of the 2014 properties adjacent to the sediment pools will be maintained. The filling of the sediment pools over their projected life will eventually result in a reduction in property values unless action is taken to periodically remove some of the sediment. Property values were discounted beginning in year 60 to reflect the adverse affect of sediment accumulation.

- Alternative No. 3B: Same as Alternative 3A. The removal of sediment in FRS No. 5A would enhance the area around the structure. However, it will require periodic reshaping of the sediment pool. Property values were discounted beginning in year 60 to reflect the adverse affect of sediment accumulation.

Fish Habitat

- Present Conditions: About 24.4 acres of fish habitat is provided by the sediment pools. Average depth is approximately five feet with maximum depths of some six to eight feet. The lakes retain sufficient water to support a fishery even during drought periods. Water quality is adequate for fish production. A survey of the lakes was not conducted to determine species present and condition of the existing population. A landowner survey indicated that fishing was a minor recreational activity on the sites and respondents indicated that fishing quality was poor to fair. Floodwater retarding structures were usually stocked with largemouth bass, bluegill sunfish and channel catfish following construction and typically have become populated with other species such as bullhead catfish, carp, and crappie from upstream ponds and baitfish dumping. Wilson Creek is subject to loss of all fish populations during drought periods and is repopulated by upstream movement of fish during times of high flow from downstream sources. During flood flows fish from the upstream sites also move downstream to a limited degree. Catfish, carp and sunfish are species best adapted to these conditions.

  The lakes have the potential for a managed fishery, if residents so desire. Fish for restocking in private waters are no longer provided by state or federal agencies but are available from private sources. Costs for restocking typically ranges from $300 to $500 per acre, depending upon species and quantities desired.

- Alternative No. 1: This alternative would remove the existing fishery and fish habitat.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: Rehabilitation of the dams would require temporarily draining the existing sediment pools during construction. In time, the depth and size of the lakes would be reduced through sedimentation processes. As the lakes become shallower, it is expected

that turbidity would increase and the lakes may become too shallow to support a fishery. Draining of the sediment pools during construction would result in loss of the existing fish population. It is anticipated that the pools would be restocked. This would provide for the opportunity to enhance the fishery by better management. Modification of the spillway flow may result in a slight increase in numbers of fish moving downstream during flood events.

- Alternative No. 3B: Same as Alternative No. 3A with one exception. Removal of sediment and reshaping of the shoreline in FRS No. 5A would enhance the habitat for fish.

Wildlife Habitat

- Present Conditions: Wildlife habitat associated with the site consists of wooded riparian areas and open grasslands. The wooded areas have developed along and adjacent to stream channels since construction occurred. Woody vegetation consists primarily of elm, oak, hackberry, Osage orange, willow, ash, cedar, and pecan. The wooded plant community is diverse and has evolved with no grazing by livestock during recent times. It provides habitat for numerous songbirds and small mammals and is especially valued since such habitat is limited in urban areas. Open grassland areas are mowed on a regular basis, which limits species diversity. These areas are composed primarily of short and mid-grasses such as Bermuda grass, Texas winter grass, three awns, and tridens and drop seeds. Forbs are primarily annuals. The seeds of grasses and forbs provide a limited food supply for birds and small mammals.

- Alternative No. 1: This alternative would provide an additional 24.4 acres of upland wildlife habitat consisting primarily of open grassland habitat when the sediment pools were drained. The quality of this habitat would be limited in its initial stages and would improve as the plant community evolved. Wooded habitat would develop in time on areas adjacent to the stream channels that were left unmowed. The water source for wildlife provided by the 3 lakes would be removed. Existing woody habitat downstream from the dams would be removed to provide for floodwater flow. The channels downstream from the dams to Wilson Creek might require modification to contain flood flows resulting in removal of additional wooded riparian habitat.

- Alternative No. 2: This alternative would result in the establishment of about 24.4 acres of wooded and open wildlife habitat in the sediment pool areas of better quality than that provided by Alternative No. 1. Other impacts would be similar to Alternative No. 1.

- Alternative No. 3A: This alternative would require the removal of about 3 acres of existing wooded habitat and disturb about 11.2 acres of open grassland habitat. The removal of vegetation would only be that necessary to allow rehabilitation of the structures. Disturbed areas would be reestablished to adapted native species providing food and cover for wildlife. Woody species would be used where adapted and appropriate. The auxiliary spillway areas would be maintained in herbaceous vegetation to allow proper function. Areas below the dams would be re-vegetated to a mixture of native species including trees and shrubs having wildlife value.

Modifications of the auxiliary spillway and principal spillway on site 3D would require the removal of about 0.5 acre of wooded habitat consisting of eastern red cedar, black willow, Texas ash, hackberry, Osage orange, and grape. About 2.43 acres of open grassland would be disturbed. Herbacious species include Texas wintergrass, dropseeds, Bermuda grass, bushy bluestem, crotons, milkweed, and ragweed.

Modifications needed on site 3E would involve widening and renegotiating the auxiliary spillway and replacing the principal spillway. The principal spillway work downstream from the dam would require removal of about 0.2 acre of wooded habitat consisting of Osage orange, elm, pecan, cedar, elm, and hackberry. Minor modification of the auxiliary spillway would not affect any wooded habitat and will disturb about 1.3 acres of open grassland habitat.

Modifications to the auxiliary spillway on site 5A would require removal of about 1.8 acres of wooded vegetation to widen the spillway the required amount. Species that would be removed include elm, Osage orange, pecan, oak, chinaberry, and ash. About 3.2 acres of open grassland would be affected by construction. Adding a new principal spillway and a release channel below the dam would require the removal of about 0.5 acres of wooded habitat. This habitat contains some large cottonwood, pecan and elm trees as well as black willow, hackberry and cedar. The release channel would be located to avoid as many of these large trees as possible. Re-vegetation plans would include woody species consisting of trees and native adapted shrubs in this area.

- Alternative No. 3B: Will be the same as site 3A, except an additional 1.3 acres of existing habitat in the detention pool will be affected by the pit constructed for sediment disposal. About 0.3 acres contains trees consisting primarily of elm.

Recreation

- Present Conditions: The three structures are an integral part of the area. Development and homeowner organizations have integrated the structures into their recreational facilities. The sediment pools as well as the detention pools have become a focal point of the subdivisions for scenic views, wildlife and tranquil walks around the lakes. Although none of the three structures have been developed for water-based recreation, some are used extensively for recreation. Typically, homeowner organizations install and operate recreational facilities in the developments. Recreational facilities typically consist of hike and bike trails. Portions of the trails are located in the detention pools of the structures and the presence of water adds to the value of the recreational experience. There is some incidental use of the sediment pools for fishing. A portion of Eldorado's Country Club's golf course is located in the detention pool of FRS No. 5A. Also, the club utilizes water from the sediment pool for irrigation of the golf course. During floods, a portion of the course is closed for several days until the floodwater is evacuated. In addition, the City of McKinney has installed extensive recreational facilities on the flood plain of Wilson Creek downstream of these structures. These facilities have an estimated 162,000 visitors per year. The recreational facilities are frequently flooded.

- Alternative No. 1: Loss of the sediment pool would reduce the value of the recreational experience of the residences adjacent to FRS Nos. 3D, 3E, and 5A. The value of the reduction of visitor days is reflected in the fair market value of the properties within the subdivisions. The recreational facilities on Wilson Creek would be damaged by increased flooding.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: The recreational experience would be maintained. Further development would most likely cause an increase in the number of visitor days. Damage to downstream recreation infrastructure and public recreation use would be prevented.

- Alternative No. 3B: Same as Alternative No. 3A with one exception. The problems associated with shallow water and excessive aquatic vegetation would be reduced. The value of the recreational experience adjacent to FRS No. 5A would be increased slightly.

Flood Plain Management Plan

- Present Conditions: The structures are part of the City of McKinney Floodplain Management Plan (FMP).

- Alternative No. 1: Flood peaks would increase downstream of the three structures resulting in increased flood depths. A revised flood plain management plan would have to be developed.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: Integrity of the City's FMP would be maintained.

- Alternative No. 3B: Integrity of the City's FMP would be maintained.

Storm Water Management Plan

- Present Conditions: The City of McKinney storm water management plan has incorporated the effects of the structure.

- Alternative No. 1: The City would implement measures to partially offset the loss of management provided by the structure.

- Alternative No. 2: Same as Alternative No. 1.

- Alternative No. 3A: The integrity of the City's plan would be maintained, and additional compliance costs would be avoided.

- Alternative No. 3B: The integrity of the City's plan would be maintained, and additional compliance costs would be avoided.

Table B lists the previously described high and medium concerns identified during the scoping process and an estimate of the remaining concerns if the alternative were implemented:

Table B – Comparison of Remaining Concerns					
Concerns	**Present Conditions**	**Alternative No. 1**	**Alternative No. 2**	**Alternative No. 3A**	**Alternative No. 3B**
Dam Safety	High	Low	Low	Low	Low
Life of Structure	High	Low	Low	Low	Low
Human Health & Safety	High	Medium	Medium	Medium	Low
Flood Damages	High	High	High	Low	Low
T&E Species	Medium	Low	Low	Low	Low
Cultural Resources	Medium	Low	Low	Low	Low
Wetlands	Medium	High	High	Low	Low
Air Quality	Low	Low	Low	Low	Low
Water Quality	High	Low	Low	Medium	Low
Water Quantity	High	Low	Low	Medium	Low
Aesthetics	High	High	High	Medium	Low
Sediment	High	Low	Low	High	Medium
Land Values	High	High	High	Medium	Medium
Fish Habitat	Medium	Low	Low	Medium	Low
Wildlife Habitat	Medium	Low	Low	Low	Low
Recreation	Medium	High	High	Low	Low
Flood Plain Management Plan	High	High	High	Low	Low
Storm Water Management Plan	High	High	High	Medium	Low

COMPARSION OF ALTERNATIVES

Table C compares each of the alternatives.

Table C – Comparison of Alternatives				
EFFECTS	**Alternative No. 1**	**Alternative No. 2**	**Alternative No. 3A**	**Alternative No. 3B**
Description	***No Action***	***Decommission FRS 3D, 3E, &5A***	***Rehabilitate FRS 3D, 3E, & 5A***	***Rehabilitate FRS 3D, 3E, & 5A (Sediment Removal 5A)***
Project Investment	$1,653,700	$2,089,700	$ 3,289,715	$ 3,466,114
Annual Costs	$ 95,200	$ 120,300	$ 201,968	$ 215,971
Annual Benefits	($ 95,200)	($ 120,300)	$ 397,310	$ 397,310
Net Monetary Benefits	($ 95,200)	($ 120,300)	$ 195,342	$ 181,339
Water	Loss of sediment pools (24.4 acres)	Loss of sediment pools (24.4 acres)	Maintain sediment pools (24.4 acres)	Maintain sediment pools 24.4 acres)
Land	Minor erosion during construction. Sediment pools (24.4 acres) converted to open area. Aquatic to upland?	Minor erosion during construction. 24.4 acres of open Sediment pools (24.4 acres)) converted to open area. Aquatic to upland	Minor erosion during construction. 14.2 acres disturbed during construction.	Minor erosion during construction. 14.2 acres disturbed during construction
Air	Minor adverse during construction	Minor adverse during construction	Minor adverse during construction	Minor adverse during construction
Plants & Animals	Loss of 24.4 acres of fish and wildlife habitat	Loss of 24.4 acres of fish and wildlife habitat	Fish & wildlife habitat maintained	Fish & wildlife habitat maintained. Fishery enhanced in FRS No. 5A.
Threatened & Endangered Species	No effect	No effect	No effect	No effect
Area Economy	Removal of the dams will be negative	Removal of the dams will be negative	Economy maintained & enhanced	Economy maintained & enhanced
Human Resources	Reduced threat to loss of life	Reduced threat to loss of life	Threat to loss of life removed	Threat to loss of life removed
Cultural Resources	No effect	No effect	No effect	No effect

Table C – Comparison of Alternatives, cont.				
EFFECTS	**Alternative No. 1**	**Alternative No. 2**	**Alternative No. 3A**	**Alternative No. 3B**
Description	***No Action***	***Decommission FRS 3D, 3E, &5A***	***Rehabilitate FRS 3D, 3E, & 5A***	***Rehabilitate FRS 3D, 3E, & 5A (Sediment Removal 5A)***
Other Social Effects	Increased damage to recreational facilities and reduced value of recreational experiences	Increased damages to recreational facilities and reduced value of recreational experiences	Recreation opportunities maintained. Flood protection to recreational facilities maintained.	Recreation opportunities maintained. Flood protection to existing recreational facilities maintained. Value of recreational experiences associated with FRS No. 5A will be increased slightly.

Table D compares the monetary effects and associated impacts of the alternatives:

Table D, Summary of Benefits, East Fork Above Lavon Watershed, FRS No.'s 3D, 3E & 5A [1/]

Item	Alternative No. 1 No Action (Future Without)	Alternative No. 2 Decommission FRS Nos.3D, 3E, and 5A		Alternative No. 3A Rehabilitate FRS Nos. 3D, 3E, and 5A		Alternative No. 3B Rehabilitate FRS Nos. 3D, 3E, and 5A (Sediment Removal FRS No. 5A)	
	Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits
Original Downstream Benefits [2/]	$0	$0	$0	$ 31,400	$ 31,400	$ 31,400	$ 31,400
Property Values (upstream area) [3/]	$0	$0	$0	$226,506	$226,506	$226,506	$226,506
Recreation Facilities and Participation [4/]	$0	$0	$0	$ 1,988	$ 1,988	$ 1,988	$ 1,988
Downstream Infrastructure [5/]	$0	$0	$0	$137,416	$137,416	$137,416	$137,416
Total	$0	$0	$0	$397,310	$397,310	$397,310	$397,310

1/ All numbers reflect 2003 average annual dollars.

2/ Updated using applicable indices.

3/ Reflects avoidance of upstream property values devaluation.

4/ Reflects damage avoidance to downstream recreation facilities and public recreation use.

5/ Reflects avoidance of downstream channel modification, construction costs for bridge modifications on FRS Nos. 3D and 5A and modifying City's Storm Water Management Plan.

RISK & UNCERTAINTY

The areas of risk and uncertainty associated with this project lie with the accuracy of the cost estimates of each of the alternatives, the reliability of assessment of impacts, and computer models used in evaluation and design. The scoping process was used to determine the procedures to be used and the needed reliability. The computer models used in evaluation and design of the modification of the dams are generally accepted computer models for this type of work. The procedures used in developing the detail and cost estimates for each alternative are considered adequate to compare the alternatives and make an assessment of the impacts. One area of uncertainty is in the projection of the rate of development of the area. The area is projected to become fully developed and this condition was used in the projection of runoff, erosion and sediment and in the estimates of economic impacts. Based on recent trends, the projections are reasonable and in the case of the design of the structures provide for the most conservative design. There does not appear to be any area that using different procedures or making more intensive studies would have resulted in a different decision.

RATIONALE FOR PLAN SELECTION

For water and related land resources implementation studies, standards and procedures have been established in formulating alternative plans. These standards and procedures are found in "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)." According to P&G, an alternative that reasonably maximizes net national economic development benefits is to be formulated. This alternative is to be identified as the National Economic Development Plan (NED). Alternative No. 3A (Rehabilitation of FRS Nos. 3D, 3E, and 5A) is the NED plan and will increase the nation's economic output. Annual benefits total $397,310 and annual cost is estimated at $201,968 resulting in a net benefit of $154,800. This is a benefit to cost ratio of 1.97 to 1.0. The existing dams have already provided significant flood protection downstream, as well as enhanced upstream property values.

Alternative 3B (Rehabilitate FRS Nos. 3D, 3E, and 5A {Sediment Removal FRS No. 5A}) requires periodic sediment removal (during construction, at 25 years and at 50 years). Annual benefits total $397,310 and annual cost is estimated at $215,971 resulting in a net benefit of $181,339 and a B:C ratio of 1.84 to 1.0.

Alternative plans, including the NED plan, should be formulated in consideration of four criteria or tests: completeness, effectiveness, efficiency, and acceptability. These tests were applied to each of the alternatives. All four alternatives meet the tests of completeness. Alternative Nos. 1 and 2 remove the safety hazard but do not address the core problem of assuring that the dams will continue to provide downstream flood protection. Alternative No. 3A is very effective in reducing the safety hazard and assures continued downstream flood protection. However it does not address the problems associated with shallow water in the upper end of the sediment pool of FRS No. 5A and a small pond in the detention pool of 5A. Alternative No. 3B is very effective in reducing the safety hazard and assures continued downstream flood protection. It also addresses the problems associated with shallow water in 5A.

Alternative Nos. 1 and 2 were not acceptable to the local people because they failed to meet their objectives. Alternative No. 3A is the most efficient way to accomplish the desired objectives of

removing the safety hazard and assure continued performance. Although many local citizens preferred Alternative No. 3B, it was not selected because cost sharing is not available for the removal of the sediment through the rehabilitation program and no entity was identified to sponsor the work.

Alternative No. 3A is the preferred alternative. It meets the purpose and need to maintain the present level of flood control benefits, comply with current performance and safety standards, and continues to properly function into the future. It also produces the most net monetary benefits and a sponsor has agreed to underwrite the local share of the costs.

CONSULTATION & PUBLIC PARTICIPATION

At the beginning, the appropriate state and local agencies were informed of the effort and invited to offer input. Several coordination meetings were held with the Texas State Soil and Water Conservation Board and dam safety representatives of the Texas Commission on Environmental Quality (TCEQ). A public meeting was held at the City of McKinney on November 20, 2002 to inform the public of the initiation of planning and request oral and written input. The notice of the meeting was posted and published in the local newspaper. Representatives of US Army Corps of Engineers, US Fish & Wildlife Service, US Environmental Protection Agency, and the Texas Parks and Wildlife Department participated in a field review of the proposal on February 12, 2003. The Texas Commission on Environmental Quality was also invited but did not send a representative. A steering committee made up of representatives of the Sponsors, local homeowners and other interested citizens was organized. Input received from the group was used to scope the environmental assessment, and develop and evaluate alternatives. A landowner survey was developed and provided to area residents who lived adjacent to the sites.

Comments on the Draft Supplemental Watershed Plan/Environmental Assessment were requested from the following federal, state, and local agencies and organizations:

Governor - State of Texas
Texas Office of State-Federal Relations (State Single Point of Contact)
Texas State Soil and Water Conservation Board
Texas Commission on Environmental Quality
Texas Parks & Wildlife Department
Texas Water Development Board
Texas Agricultural Experiment Station
Texas Historical Commission
US Army Corps of Engineers, Ft. Worth
USDI-Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
USDA-Forest Service
City of McKinney
Collin County Commissioners Court
Grayson County Commissioners Court
Upper Elm-Red Soil and Water Conservation District
Collin County Soil and Water Conservation District
City of Van Alstyne, Texas
City of Anna, Texas

Discussion and Disposition of comments from letters received on the Draft Supplemental Watershed Plan/Environmental Assessment hereinafter referred to as Plan/EA.

Not all agencies and groups requested to comment on the Plan/EA submitted comments. The responding agencies and groups' comments and the disposition of each are as follows:

Texas State Soil & Water Conservation Board

Comment: Several minor editorial errors were noted as follows:

- Appendix C, Breach Inundation Maps: This appendix contained three copies of the map for site 3D and no maps for Sites 3E and 5A.
- Appendix E, Table 3: There were several footnote references in the table, but the notes themselves were not listed.
- Appendix E, Table 6: The value of the annual recreation benefits for FRS 3D appears to be incorrect ($57,717,100).
- Breach Inundation Map File, 3E Breach.pdg: The last valley cross section in the Breach Water Surface Elevations table appears to be mislabeled. It should be "3E-W1" instead of "3D-W1."

Response: The following actions were taken:

- The breach inundation maps were corrected in the electronic version of the Plan/EA.
- The footnotes were lost when the document was converted to PDF format.
- The value of the annual recreation benefits for FRS 3D was corrected.
- The table of surface elevations was corrected.

Comment: This project is essential to maintain the flood control benefits the structure currently provides and to comply with current performance and safety standards. We strongly support this project and commend the project sponsors and NRCS for implementing this rehabilitation effort.

Response: Noted.

Texas Water Resources Institute

Comment: The agency had no comment but wanted to thank NRCS for the valuable service it provides to Texans in assisting with flood control through these and similar projects.

Response: Noted.

United States Department of the Interior, Fish and Wildlife Service

Comment: The floodwater retarding structures are located in highly developed residential areas and have been identified as high hazard dams because of development within the areas that may flood should a dam breach occur. With the structures being in highly developed areas, impacts from shoreline mowing, non-point source pollution and cultural/recreational activities have inhibited the establishment of high quality fish and wildlife habitat beneficial to the Service's trust resources such as waterfowl, federally listed, or migratory wildlife species. Therefore, we

concur with your finding that Alternative 3a will retain existing habitat values and will have minimal adverse impacts to trust resources.

Response: Noted.

Texas Water Development Board

Comment: Based on the urbanization of the area since the structures were first approved for operation, there appears to be a significant need to ensure greater protection to downstream life, properties, and infrastructure. The proposed project would minimize the risk of dam failure and assure that the flood control structures will continue to function safely in the future. These are all goals that the TWDB concurs are important.

Response: Noted.

Comment: The proposed rehabilitation of the floodwater retarding structure has no conflicts with the existing or future proposed water planning strategies in the regional or state water plans.

Response: Noted.

Clayton Myhre and Laurie Medeiros, Steering Committee

Comment: Commended the NRCS, its staff, and Wilson & Company employees for their dedicated work and guidance through the planning of the project. Also commended NRCS for providing the report in electronic form.

Response: Noted.

Comment: Page iv of Agreement – Suggested that a note be added to explain why estimated total project costs do not agree with other parts of the document.

Response: Page iv of the Agreement –The information requested was in the preceding paragraph. The two paragraphs have been combined.

Comment: Page iv of the Agreement – Requested cost sharing arrangements be clarified to explain what happens if actual costs are different than estimate of costs in the document.

Response: No change. The first part of the added paragraph states that the cost sharing will be based on the actual costs of the project.

Comment: Page 2 – Stated that the drainage areas of the three structures are different than the as built plans for the structures and a report prepared by Freese and Nichols. Recommended explaining the differences.

Response: A note was added to the "Description of Existing Dams Section" that the drainage area of FRS No. 3D and 5A are slightly less than the drainage area determined when the existing dams were constructed.

Comment: Page 2 – Commented that the estimated January 2003 population of the City of McKinney is 74,108. Recommended using the latest estimate.

Response: The estimate of the population was changed throughout the document.

Comment: Page 3 – Commented that project costs do not agree with agreement.

Response: No change. See response to a previous comment.

Comment: Page 6 – Stated that the project area does not agree with the drainage area of the original dam documents.

Response: No change. The project area includes the updated drainage area of three structures plus the breach area. This is explained in the plan.

Comment: Page 6 – Suggested adding a statement that proper erosion control measures must be implemented and enforced during and after development to realize the projected sediment rates.

Response: Narrative added.

Comment: Page 8 – Suggested adding narrative about improvements below FRS No. 3E.

Response: Narrative added.

Comment: Page 9 – Requested that additional information concerning a possible failure of a different portion of FRS No. 5A be added and included on the breach map.

Response: Narrative was added to the plan to address a potential breach of the North portion of the dam. The breach map was not modified because of the proximity of the dam to the 100-year floodplain and the easement area for the auxiliary spillway.

Comment: Page 15 – Recommended that the costs of providing a project life of 100-years for FRS No 5A be developed and displayed.

Response: The costs of providing the 100-year sediment storage capacity in 5A was added. It would require removing about 28.5 acre feet of sediment and raising the elevation of the crest of the principal spillway. The cost estimate assumes that the sediment can be disposed of safely at a reasonable cost.

Comment: Page 25 – Commented that the statement that sediment had been removed once from the sediment pool of FRS No 5A once was incorrect. Also stated that the sediment rates used in the design of the structures are lower than what is occurring and causes concern that projected life of the structures will fall short of projections. Pointed out that two ponds located in the drainage areas of FRS No. 5A serve as settling basins and capture sediment before it goes into the sediment pool of FRS No. 5A.

Response: The sediment rates were based on sedimentation surveys of floodwater retarding structures in Texas and adjusted to the conditions of the three structures in this project. Also

additional information concerning removal of sediment from FRS No5A and the upstream ponds were added to the narrative.

Comment: Page 25, Land Values – Stated that one sentence did not make sense and asked the basis for the evaluation.

Response: The sentence in question was corrected. The evaluation was based on a study by a professional land appraiser who works in the area. The study provided the projected changes in value under several scenarios. These changes were applied to the value of the properties. Values were discounted for a lag in development.

Comment: Page 32, Table C – Suggested carrying heading to top of each page of elevation for readability of report.

Response: Changed as suggested.

Comment: Page 38 – Suggested adding "Appendix E" to narrative.

Response: Changed as suggested.

Comment: Page 39, List of Preparers – Suggested some editorial changes and adding a list of Steering Committee as well as City staff and council involved.

Response: Made suggested changes and added list of steering committee. Assistance of the City of McKinney council and staff was acknowledged.

Comment: Appendix C – Request breach area of the North Portion of FRS No. 5A.be included on the map.

Response: No change. See response to previous comment.

Comment: Appendix E, Table 1 – Suggested referring to Table 2.

Response: No change. Most users of the plan are familiar with the content of the tables.

Comment: Appendix E, Table 2 – Suggested additional columns be added to help clarify cost sharing and requested cost sharing arrangements be clarified to explain what happens if actual costs are different than estimated costs in the document.

Response: No changes. The notes on the table and elsewhere in the report provide adequate information of the estimated costs of the project.

RECOMMENDED PLAN

Alternative No. 3A is the preferred alternative and includes modification of FRS Nos. 3D, 3E and 5A to meet current performance and safety standards for high hazard dams. This requires adding sufficient additional principal spillway and auxiliary spillway capacity to each structure to meet high hazard hydrological criteria. FRS Nos. 3D and 3E have sufficient sediment storage capacity for the projected 75-year sediment accumulation. Raising the elevation of the principal

spillway of FRS No.5A will provide for the additional storage capacity to meet the projected 75-year life.

FRS No. 3D:

Modification of this structure consists of adding a 30-inch hooded inlet principal spillway with impact basin and replacing the slide gate valve on the existing principal spillway. The auxiliary spillway will be widened from 60 feet to 135 feet and the crest lowered in elevation by 0.9 feet. The top of the dam will be raised in elevation by 0.5 feet. The added principal spillway will be constructed with reinforced concrete pipe. Construction activities will result in the disturbance of approximately 0.5 acres of wooded upland, and 2.4 acres of open grassland. The removal of vegetation will only be that necessary to allow rehabilitation of the structure. Disturbed areas will be reestablished to adapted native species providing food and cover for wildlife. Woody species will be used where adapted and appropriate.

FRS No. 3E:

Modification of this structure consists of complete removal of the existing corrugated metal principal spillway and replacing it with a 30-inch standard inlet principal spillway with impact basin. The new principal spillway will be reinforced concrete pipe. The auxiliary spillway will be maintained at the current 50 feet width and the crest lowered in elevation by 3.6 feet. The slope at the juncture of the dam and spillway will be altered to accommodate this change in elevation by modifying and protecting the site slope in that location. The top of the dam will be raised in elevation by 0.4 feet. Construction activities will result in the disturbance of approximately 0.2 acres of wooded upland, and 1.3 acres of open grassland. The removal of vegetation will only be that necessary to allow rehabilitation of the structure. Disturbed areas will be reestablished to adapted native species providing food and cover for wildlife. Woody species will be used where adapted and appropriate.

FRS No. 5A:

The modification will consist of installing an additional 60-inch diameter principal spillway, widening the present auxiliary spillway from 100 feet to 400 feet, and raising the top of dam by about 0.5 foot. The auxiliary spillway will be divided into two sections divided by an earthen dike. Construction activities will result in the disturbance of approximately 2.3 acres of wooded upland, and 7.5 acres of open grassland. The removal of vegetation will only be that necessary to allow rehabilitation of the structure. Clearing of trees in front of the auxiliary spillway will be limited to the minimum needed to assure proper functioning of the spillway. Disturbed areas will be reestablished to adapted native species providing food and cover for wildlife. Woody species will be used where adapted and appropriate.

The top of the dam will be raised one-half foot using earth fill by "capping" and will be vegetated. The footprint and slopes of the existing dam will not be affected by the addition of this cap. The additional principal spillway will consist of a 60-inch diameter reinforced concrete pipe with a standard riser inlet. The crest will be 2.0 feet above the elevation of the existing principal spillway providing additional sediment storage, but ported to maintain the current water surface. This will minimize adverse impacts to the golf course for the near future. An impact basin will be installed at the end to dissipate energy. The additional principal spillway will be located south of the existing principal spillway and will empty into the stream downstream of the

dam near the outlet of the last "reflecting pond" supplied by the existing principal spillway. All disturbed areas will be vegetated. A new trash guard and slide gate will be installed on the existing principal spillway.

COMPLIANCE WITH LOCAL, STATE, AND FEDERAL LAWS

All applicable local, state, and federal laws will be complied with in the installation of this project. Construction activities will require a Storm Water Pollution Prevention Plan (SWPPP). The Corps of Engineers has indicated that the project will require authorization under Section 404 of Clean Water Act, and that the project likely falls within the scope of an existing nationwide permit (NWP#3 Maintenance).

Efforts to identify cultural resources have been conducted in compliance with Section 106 and Section 110 (f) and (k) of the National Historic Preservation Act. No historic properties were identified in the areas of Alternative 3A or 3B and no known sites are recorded in the vicinity. Ensuing disturbances associated with rehabilitation measures will be monitored for the presence of undiscovered sites. In the event of such discovery, appropriate actions will be taken in accordance with the State Level Agreement among NRCS and the Texas State Historic Preservation Officer, the National Programmatic Agreement between NRCS, the National Conference of State Historic Preservation Officers, and the Advisory Council on Historic Preservation, and NRCS General Manual 420, Part 401 guidance.

OPERATION AND MAINTENANCE

The Collin County Soil and Water Conservation District, the Collin County Commissioners Court, and the City of McKinney will be responsible for the operation, maintenance, and any needed replacement of the works of improvement for 75-years following completion of construction by actually performing or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work. The Collin County Commissioners Court has the prime responsibilities for maintenance of FRS Nos. 3D, 3E, and 5A. The City has agreed to assist in the maintenance. O&M activities include, but are not limited to inspections, maintenance and repairs of the principal spillways, dams, vegetation and the auxiliary spillways. It is estimated that O&M activities will amount to about $6,000 per year.

CONTROLS ON DOWNSTREAM DEVELOPMENT

The City of McKinney has a plan in place to control downstream development. They presently prevent development in the breach area of the existing dams. They also have an ongoing flood plain management plan which controls development in the flood plain.

FINANCING ARRANGEMENTS

The installation of the project will be financed jointly by the City of McKinney and NRCS. NRCS will use funds appropriated for this purpose. The City of McKinney has approved a bond issue for its share of the costs.

The total estimated installation cost of the project is $3,289,715 (Appendix E, Table 1). Appendix E, Table 2 provides the Estimated Total Cost Distribution for the Project.

In accordance with the Memorandum of Understanding entered into between the City of McKinney, Texas and the NRCS, the amount of Federal funds that will be made available for the rehabilitation of the three floodwater-retarding structures shall be equal to 65 percent of the total rehabilitation costs but shall not exceed 100 percent of the actual construction costs incurred in the rehabilitation. Other funds will bear the remaining 35 percent of the costs. An amount up to the percentage rate specified may be satisfied by the Sponsoring Local Organization for cost of an element such as engineering, real property acquisition, planning or construction. The decision to, and arrangements for, such action will be negotiated between the sponsors and NRCS and will be included in a project agreement executed immediately before implementation.

NRCS is responsible for the costs of engineering services ($183,140) and project administration ($137,355) it incurs. The costs of all water, mineral, and other resource rights and all Federal, State, and local permits are not considered part of the total costs of the rehabilitation project and are the responsibility of the Sponsors.

LIST OF PREPARERS

Name & Present Title	Education	Experience (Years)
Allan Colwick, P.E., R.P.L.S., Watershed Specialist – Wilson & Company	B.S. Agricultural Engineer.	42
Eugene Lindemann, P.E., Senior Planner – Wilson & Company	Ph.D.Agricultural Engineering	41
Frank Sprague, Biologist – Wilson & Company	B.S. Wildlife Management	35
Calvin Sanders, Cultural Resources Specialist – NRCS	M.A. Anthropology	22
Charles Baird, P.E., Watershed Specialist – Wilson & Company	B.S. Agricultural Engineering	36
James Featherston, Agricultural Economist – NRCS	M.S. Agricultural Economics	27
Dave Petefish, Geologist – NRCS	M.S. Geology	28
David Strakos, Civil Engineering Technician – NRCS	High School Diploma	25
Scott Hoag, Agricultural Economist – Wilson & Company	M.S. Agricultural Economics	30
James Neighbors, Resource Conservationist – NRCS	M.S. Range Management	35
Pete Waldo, Geologist – NRCS	Ph.D. Mathematical Sciences	30
Ronnie Skala, P.E. Hydraulic Engineer – NRCS	B.S. Agricultural Engineering	24
Sam Stewart, Resource Conservationist – NRCS	B.S. Agriculture	36
Clyde Hogue, Resource Conservationist – NRCS	M.S. Agricultural Sciences	15
Charles Easterling, P.E., Director of Water Resources – Wilson & Company	M.S. Civil Engineering	30
Bonnie Simmons, Admin. Assistant – Wilson & Co.	A.A. Business Admin.	17
J.M. "Mike" Woodson, P.E., Watershed Specialist – Wilson & Company	B.S., Civil Engineering	40

In addition to the above named preparers, we would like to acknowledge the contributions of Ringley and Associates, Jim Goodrich, and Dr. John A. Dunbar and Dr. Peter M. Allen, Geology Department, Baylor University for their technical input into this project. We would also like to acknowledge the input of the Steering Committee and the City of McKinney council and staff for their valuable input into the planning of the project (see next page for list of steering committee members).

Steering Committee Members

Name	Company or Organization Name
Billy W. Turrentine	Dam Owner (3D)
Bourdon Barfield	Provine Farms HOA Representative (3E)
Bry Taylor	President of Bryson Realtors (5A)
Clayton Myhre	Dam Committee Chairman (At large member)
Don Christenson	President of Eldorado HOA
Eric Zepp	Provine Farms HOA President (3E)
George B. Gibson	Property Owner (3D)
Greg Herbst	President of Eldorado HOA 2 (5A)
Joe Bass	Property Owner (3E)
Joseph Montez	Manager of Eldorado Country Club (5A)
Laurie Medeiros	Dam Committee Secretary (At large member)
Michael Hebert	City of McKinney
Jon Kleinheksel	Collin County
Sam Crowe	Black Diamond Group Spokesperson (5A)
Warren Blackmon	CC Soil & Water Conservation District
Wayne Bailey	Provine Farm owner's representative (3E)
Bill Whitfield	Mayor, City of McKinney (At large member)

INDEX

REFERENCES

1. Freese & Nichols, Inc., July 1, 1999. The City of McKinney, Storm Water Ordinance.

2. Freese & Nichols, Inc., March 2001. Dredging Feasibility Study for Eldorado and Mallard Lakes in McKinney, Texas.

3. Nathan D. Maier Consulting Engineers, Inc., May 1988. McKinney Floodplain Management Study, City of McKinney, Texas.

4. Texas Archeological Sites Atlas, February 2002.

5. USDA Soil Conservation Service, August 1956. Work Plan, East Fork above Lavon Watershed of the Trinity River Watershed, Collin and Grayson Counties, Texas.

6. Water and Sediment Volume Survey of Flood Control Reservoirs, 5A, 3D, and 3E, McKinney, Texas, December 2002.

APPENDIXES

APPENDIX A: Comments Received on the Supplemental Plan/Environmental Assessment

APPENDIX B: Vicinity Map

APPENDIX C: Breach Inundation Maps

APPENDIX D: Project Map

APPENDIX E:

Table 1 – ESTIMATED INSTALLATION COST

Table 2 – ESTIMATED COST DISTRIBUTION – STRUCTURAL AND NONSTRUCTURAL MEASURES

Table 3 – STRUCTURAL DATA–DAM WITH PLANNED STORAGE CAPACITY

Table 4 – ANNUAL COSTS

Table 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE BENEFITS

Table 6 – COMPARSION OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

APPENDIX A

Comments Received on the Supplemental Plan/Environmental Assessment

Texas State Soil & Water Conservation Board

3 Jul 03

FILE COPY

Bode

Larry D. Butler, State Conservationist
USDA Natural Resources Conservation Service
101 South Main
Temple, Texas 76501-7602

Re: FRS 3D, 3E, & 5A East Fork Above Lavon

Dear Mr. Butler:

We have reviewed the Draft Plan Supplement and Environmental Assessment on the proposed rehabilitation of Floodwater Retarding Structures No. 3D, 3E, and 5C of the East Fork Above Lavon Watershed of the Trinity River, Collin County, Texas.

We noted several minor editorial errors:

Appendix C, Breach inundation maps. This appendix contained three copies of the map for site 3D and no maps for sites 3E and 5A.

Appendix E, Table 3. There were several footnote references in the table, but the notes themselves were not listed

Appendix E, Table 6. The value for the annual recreation benefit for FRS 3D appears to be incorrect ($57,717,100).

Breach inundation map file, 3Ebreach.pdf. The last valley cross section in the Breach Water Surface Elevations table appears to be mislabeled. It should be "3E-W1" instead of "3D-W1. "

This project is essential to maintain the flood control benefits the structure currently provides and to comply with current performance and safety standards. We strongly support this project and commend the project sponsors and NRCS for implementing this rehabilitation effort.

Sincerely,

Richard Egg

Richard Egg, P.E.
Engineer

JUL 0 7 2003

311 North 5th _ P.O. Box 658 _ Temple, TX 76503 _ 254.773.2250 _ fax 254.773.3311 _ www.tsswcb.state.tx.us

Texas Water Resources Institute

THE AGRICULTURE PROGRAM
1500 Research Parkway, Suite 240
2118 TAMU
College Station, TX 77843-2118
Phone: 979.845.1851 Fax: 979.845.8554 Web: http://twri.tamu.edu

FILE COPY

Bade

July 11, 2003

Dr. Larry D. Butler
State Conservationist
Natural Resources Conservation Service
101 South Main Street
Temple, Texas 76501-7602

Dear Dr. Butler:

On behalf of the Texas Agricultural Experiment Station and Director Ed Hiler, I have reviewed NRCS Draft Plan Supplements and Environmental Assessments for proposed rehabilitation of Floodwater Retarding Structure No. 5 in Bexar County and Nos. 30, 3D, 3E, and 5A in Collin County.

I have reviewed the plans and have no comments or concerns regarding their analyses or recommendations.

I would, however, like to thank NRCS for the valuable service it provides to Texans in assisting with flood control through these and similar projects.

Sincerely,

C. Allan Jones
Director,
Texas Water Resources Institute
Assistant Vice Chancellor,
Agriculture and Life Sciences
Associate Director,
Texas Agricultural Experiment Station

CAJ/rp

United States Department of the Interior

FILE COPY

Neighbors
Bode

FISH AND WILDLIFE SERVICE
Ecological Services
WinSystems Center Building
711 Stadium Drive, Suite 252
Arlington, Texas 76011

June 11, 2003

Dr. Larry D. Butler
State Conservationist
Natural Resources Conservation Service
(Attn: Mr. James Neighbors)
101 South Main Street
Temple, Texas 76501-7602

Dear Dr. Butler:

This responds to your letter, dated June 3, 2003, requesting our review of the Draft Plan Supplement and Environmental Assessment for the proposed rehabilitation of Floodwater Retarding Structure Nos. 3D, 3E and 5A of the East Fork Above Lavon Watershed, located at McKinney, Collin County, Texas. The project is part of the Small Watershed Rehabilitation Amendments of 2000 (Section 313, PL 106-472) and involves the renovation of floodwater retarding structures to meet present safety and performance standards and other requirements to extend service life.

The Draft Plan Supplement and Environmental Assessment evaluates four project alternatives:

- *Alternative No. 1* – Future Without or No Action Plan
- *Alternative No. 2* - Decommission FRS No. 3D, 3E, and 5A
- *Alternative No 3A* – Rehabilitation of FRS No. 3D, 3E, and 5A (Raise the elevation of principal spillway.)
- *Alternative No. 3B* – Rehabilitation of FRS No. 3D, 3E, and 5A (Raise the elevation of principal spillway and remove sediment from sediment pool of FRS No. 5A.)

The floodwater retarding structures are located in highly developed residential areas and have been identified as high hazard dams because of development within the areas that may flood should a dam breach occur. With the structures being in highly developed areas, impacts from shoreline mowing, non-point source pollution, and cultural/recreational activities have inhibited the establishment of high quality fish and wildlife habitat beneficial to the Service's trust resources such as waterfowl, federally listed, or migratory wildlife species. Therefore, we concur with your finding that Alternative 3a will retain existing habitat values and will have minimal adverse impacts to trust resources.

JUN 16 2003

We appreciate the opportunity to review the draft environmental assessment and provide comments. Should you have any questions, please feel free to contact Steve Arey of my staff at the letterhead address or telephone (817) 277-1100.

Sincerely,

Tom Cloud

Thomas J. Cloud, Jr.
Field Supervisor

cc: Regulatory Branch, U.S. Army COE, Fort Worth, TX (Attn: Presley Hatcher)
Resource Protection Division, TPWD, Austin, TX (Attn: Tom Heger)
Marine & Wetlands Section, U.S. EPA, Dallas, TX (Attn: Norm Sears)
Section 401 Coordinator, TNRCC, Austin, TX (MC-150)

TEXAS WATER DEVELOPMENT BOARD

July 14, 2003

FILE COPY
Bade

Dr. Larry D. Butler, Ph.D.
State Conservationist
Natural Resources Conservation Service
101 South Main Street
Temple, Texas 76501-7602

Re: Draft Supplemental Watershed Plan No. 1 & Environmental Assessment - Rehabilitation of Floodwater Retarding Structure for East Fork above Lavon Watershed of the Trinity River Watershed

Dear Dr. Butler:

Texas Water Development Board (TWDB) technical staff has reviewed the Draft Plan Supplement and Environmental Assessment for the proposed rehabilitation of Floodwater Retarding Structures No. 3D, 3E and 5A of the East Fork above Lavon Watershed of the Trinity River Watershed in Collin County, Texas., which would provide additional safety and compliance with current performance of flood control. Based on the urbanization of the area since the structure was first approved for operation, there appears to be a significant need to ensure greater protection to downstream life, properties, and infrastructure. The proposed project would minimize the risk of dam failure and assure that the flood control structure will continue to function safely in the future. These are all goals that the TWDB concurs are important.

The proposed rehabilitation of the floodwater retarding structure has no conflicts with existing or future proposed water planning strategies in the regional or state water plans. Thank you for giving us the opportunity to review and comment on this proposed project.

If you have any questions regarding our review comments, please contact Ray Mathews of our staff at (512) 936-0822.

Sincerely,

J. Kevin Ward
Executive Administrator

P.O. Box 13231 • 1700 N. Congress Avenue • Austin, Texas 78711-3231
Telephone (512) 463-7847 • Fax (512) 475-2053
1-800-RELAYTX (for the hearing impaired)
URL Address: http://www.twdb.state.tx.us
E-Mail Address: jnfo@twdb.state.tx.us
TNRIS - The Texas Information Gateway • www.tnris.state.tx.us
A Member of the Texas Geographic Information Council (TGIC)

TNRIS

July 20, 2003

Dr. Larry Butler
Mr. James Neighbors
USDA / NRCS
101 South Main
Temple, TX 76501-7602

Dear Dr. Butler and Mr. Neighbors,

We respectfully submit the following comments regarding the Draft Supplemental Watershed Plan and Environmental Assessment for structures 3D, 3E, and 5A. We have reviewed the report, and are attaching a copy of it in Word, with our comments and suggestions for revisions.

As we are aware that the NRCS requires that all reports also be formally submitted in writing, a hard copy is also on its way to you via the US Mail.

In addition to the comments included in our review, we would like to commend the NRCS for moving this process forward by providing the report to us on CD. It is an efficient way to forward these documents to interested and involved parties. We would like to suggest that your agency consider making this information even more accessible to the public by adding a section to your website where the report could be viewed, downloaded, and comments could be received. Of course, at that time, the NRCS would have to consider also removing the requirement that input be received only by mail. This would simplify the distribution of information and streamline the input process.

We would like to commend your agency and its staff, and the members of Wilson and Company for their dedicated hard work and guidance throughout this process. Under great pressure to meet deadlines Wilson representatives, under the guidance of Charles Easterling, have shown their commitment to these rehabilitation projects. Their experience and resources have been of great value throughout the process. We are very disappointed to hear that they will no longer be working with the NRCS in the planning of these projects in Texas. We've had excellent results with our experiences with Wilson and Company. If the other firms don't live up to the standards established by Wilson and Company in McKinney, we hope that the NRCS with reopen the process to allow for additional firms to be used.

As with prior reviews, we ask that our comments be included in the final report. We are available at your convenience to discuss our comments. As always, we appreciate the opportunity to provide input.

Regards,

Clayton, Laurie

Clayton Myhre
Laurie Medeiros

CC: (via email)		
	Chuck Easterling	Alan Greer
	Larry Caldwell	Michael Hebert
	Mike Woodson	Jack Carr
	Alan Colwick	Regie Neff
	Sam Stewart	Brian Loughmiller
	Clyde Hogue	Pete Huff
	Tomas M. Dominquez	John Peterson
	Scott Hoag, Jr.	David Craig
	Joe Jaynes	Bill Whitfield

Attachment: Analysis of Draft Supplemental Watershed Plan & Environmental Analysis Population document for City of McKinney

Contact Information:	Clayton Myhre	Laurie Medeiros
	2623 Valley Creek Trail	2101 Whitney Lane
	McKinney, TX 75070	McKinney, TX 75070
	Home Phone (972) 542-8398	Home Phone (972) 529-1139
	Cell Phone (469) 450-8088	Cell Phone (214) 908-6331
	email: cmyhre782@comcast.net clayton.myhre@hillwood.com	email: mlmedeiros@comcast.net

DRAFT SUPPLEMENTAL WATERSHED PLAN No. VI & ENVIRONMENTAL ASSESSMENT

Review Comments by Clayton Myhre & Laurie Mederios

[redacted]

SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NUMBER VI.
Page iv (comment document pg iv) –

The percentages of the estimated costs of the project to be paid by the Sponsoring Local Organization and the Service are as follows:

Rehabilitation of	Sponsors	NRCS	Estimated Project Costs
FRS No. 3D	35 %	65 %	$723,420
FRS No. 3E	35 %	65 %	$665,893
FRS No. 5A	35 %	65 %	$1,579,907
[redacted]			

[redacted]

SUMMARY OF SUPPLEMENTAL PLAN/ENVIRONMENTAL ASSESSMENT

Page 2 (comment document pg 2) –

Resource Information:

Size of planning area: 2,227 acres

Page 2 (comment document pg 3) –

Problem identification: Urban development since FRS Nos. 3D, 3E, and 5A were constructed has resulted in the dams not meeting current dam safety standards. Failure of the dams would result in significant property damage and potential loss of life. FRS Nos. 3D and 3E were constructed as low hazard dams and FRS No. 5A was constructed as a significant hazard dam. Due to potential damage and loss of life as a result of a dam failure, all three dams are now high hazard dams. All of the City's 66,000 residents as well as visitors who use the streets below the dams and the City's recreational facilities are at risk from a dam failure.

Page 3 (comment document pg 3) –

Project costs:	Federal Funds	Other Funds	Total
	$2,250,485	$1,039,230	$3,289,715

Page 3 (comment document pg 4) –

Project benefits: The project will benefit all of the City of McKinney's 66,000 [redacted] residents and visitors by reducing the threat of loss of life and extending the service life of the dams. Economic average annual benefits of the project are derived from assuring the continued performance of the three structures by meeting current performance and safety standards. Benefits are based on continuing protection to the

Page 4 (comment document pg 4) –

Environmental values changed or lost: No compensatory mitigation is planned. Installation of the preferred alternative will remove only a limited [redacted] amount of woody vegetation. Disturbed areas will be replanted with a mixture of native species including woody species where adapted.

Page 6 (comment document pg 6) –

PROJECT SETTING

This .... Environmental Impact Statement for the Trinity River Watershed, dated July 1979.

The rehabilitation project area is about [redacted] acres that consists of the drainage area of the three structures plus the area that would be inundated by a breach of the dams in excess of the 100-year flood. The majority of the area is located within the western city limits of the City of McKinney, Collin County, Texas. All of the area is either urbanized or projected to be urbanized within the near future. Land use is residential, commercial, lakes, park and open areas. Average annual rainfall is slightly less than 35 inches and temperatures range from an average high of 96 degrees Fahrenheit in July to an average low of 34 degrees in January. Elevations range from 450 ft mean sea level (msl) to 700 ft msl.

The project area lies within the Blackland Prairie Physiographic Area. The topography has moderate relief with well-rounded hills and wide shallow valleys. The stream pattern is well developed. Although generally dendritic, linear segments of channels and valleys occur. Fracture directions in the underlying Austin chalk formation control their trends. Historic sedimentation rates in the region were high, averaging about 1.5 to 2 ac-ft/sq.mi/yr because of agricultural use of the rich blackland soils. Urbanization will reduce sedimentation rates to 0.6 ac-ft/sq.mi./yr [redacted] Erosion and resulting sedimentation rates on land during development are higher than after the land has been developed.

Page 6 (comment document pg 6) –

Description of Existing Dams

The .....(cropland and grassland).

McKinney was a small town with a population of about 10,000 when the original plan was developed. The population of McKinney (present population about 66,000 [redacted]) and the surrounding areas has mushroomed in recent years with continued growth projected. The watershed areas of the three structures are completely developed or projected to be completely developed in the near future.

Page 7 (comment document pg 7) –

Description of Existing Dams Continued

FRS No. 3D was constructed in 1958 and has a drainage area of [redacted] acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is a 17-inch diameter reinforced concrete pipe with an orifice plate restricting flow to 11 cubic feet per second. The maximum height of the dam is 35 feet. The present surface area of the sediment pool is about 9.3 acres. There are about 21acre feet of accumulated sediment in the sediment pool. The quality of the sediment has not been tested.

FRS No. 3E was constructed in 1967 and has a drainage area of [redacted] acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is an 18-inch diameter corrugated sheet metal pipe with an orifice plate restricting flow to 8 cubic feet per second. The maximum height of the dam is 32 feet. The present surface area of the sediment pool is about 4.5 acres. There are about 10acre feet of accumulated sediment in the sediment pool. The quality of the sediment has not been tested.

FRS No. 5A was constructed in 1958 and has a drainage area of [redacted] acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is a 17-inch diameter reinforced concrete pipe with an orifice plate restricting flow to 10 cubic feet per second. The maximum height of the dam is 35 feet. The present surface area of the sediment pool is about 10.6 acres.
[redacted]

Page 8 (comment document pg 8) –

Dam Safety

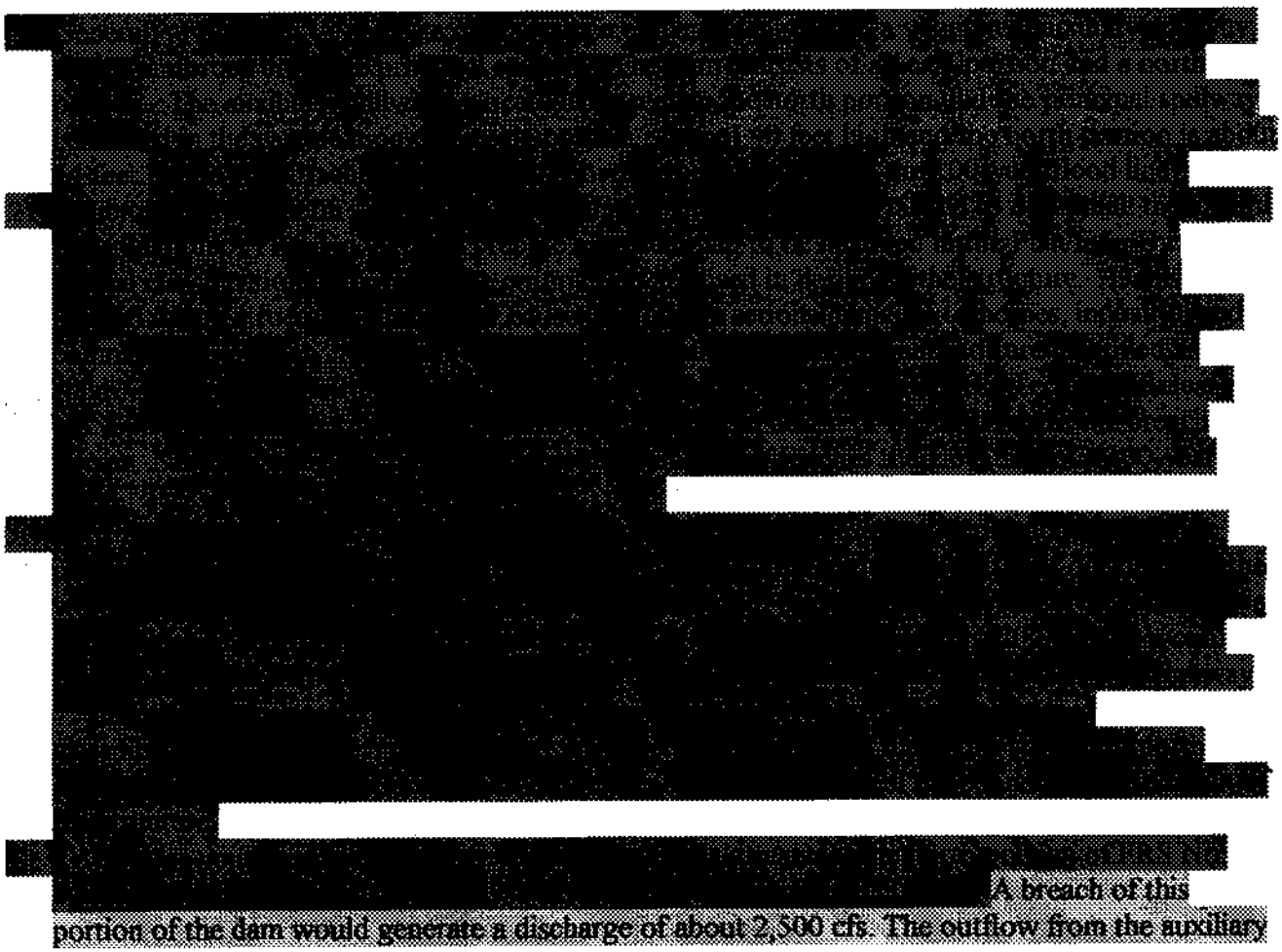
FRS No. 3E has been identified as a high hazard dam as a result of urban development in the area that will be potentially affected by a breach of the dam. Located downstream of the dam are large complexes of recreation areas [redacted]. The City on a regular basis uses these soccer, softball, and baseball fields. The soccer complex is used regardless of the weather and could be in use during a flood event. The depth of water from a breech would be about 4.0 feet on the soccer fields.

Page 9 (comment document pg 9 & 10) –

Dam Safety

FRS No. 5A has been identified as a high hazard dam as a result of urban development in the area and Central Expressway (US Highway 75) that will be affected by a breach of the dam. US Highway 75 is a major transportation route from Dallas north to the Oklahoma border. According to the Texas Department of Transportation approximately 92,000 vehicles per day use this road. Breach studies indicate that the US Highway 75 west frontage road would be overtopped by 15.2 feet, the east frontage road would be overtopped by 9.2 feet (Park Central would be overtopped by 3.5 feet, Country Club Drive would be overtopped by 9.2 feet) and the flow would be 1.7 feet below the main highway bridge if the dam failed, resulting in property and infrastructure damages and potential for loss of life. There is a 12-inch water line and there are 18-inch and 24-inch sewer lines located immediately downstream of the dam that, according to the City, would have to be repaired in the event of a breach. Also Country Club Drive is located below the dam and would have damage and potential loss of life.

[redacted]



[redacted] A breach of this portion of the dam would generate a discharge of about 2,500 cfs. The outflow from the auxiliary

spillway is greater than the discharge of a breach of the north portion of the dam.

5.

Page 15 (comment document pg 16) –

FORMULATION OF ALTERNATIVES

Different project lives as well as periods of analysis ranging from a minimum of 50-years to a maximum of 100-years were considered. The structural components of the structures will last at least 100-years with proper maintenance. Adequate capacity to store the sediment projected to accumulate over the selected project life must be provided or provisions included to periodically removing the accumulated sediment. Floodwater Retarding Structures Nos. 3D, 3E, and 5A presently have sufficient capacity to store the projected sediment accumulation for about 85, 100, and 46 years respectively. In view of this, alternatives to provide a 50-year and 75-year sediment capacity were evaluated for FRS No. 5A. Site limitations and the cost of sediment removal indicated that providing a 100-year life was not practical. Two methods of providing the capacity were considered: 1) removing accumulated sediment, and 2) raising the elevation of the principal spillway. It is estimated that it would cost about $100,000 to remove sediment to provide for the 50-year sediment accumulation, and about $600,000 to remove sufficient sediment accumulation to provide for a 75-year life. To provide for the 50-year and 75-year sediment capacity by raising the elevation of the principal spillway would cost very little because it could be accomplished at the time that a new principal spillway is installed. The estimated cost of removing the sediment assumed that the sediment is not contaminated (hazardous) and can be disposed of at a reasonable cost. A limited investigation did not indicate the presence of any hazardous contaminants. A 100-year life for site 5A could be provided by a combination of removing sediment and raising the elevation of the principal spillway. Due to the cost of removing the sediment, this option was eliminated from further consideration.

A 75-year project life and period of analysis was selected over a 50-year life project because it could be provided with little additional costs and would provide beneficial effects for a longer period of time.

Page 25 (comment document pg 26) –

Sedimentation

- Present Conditions: The sediment pools of the three dams presently have about 63 acre-feet of sediment. Sediment was removed from the sediment pool of FRS No. 5A once. [redacted] Limited testing of the sediment in FRS No. 5A did not indicate the presence of any hazardous contaminants. The projected 75-year sediment accumulation is estimated to be 169 acre-feet.

- Alternative No. 1: The 169 acre feet of sediment that would have been stored in the three structures would move and be deposited on the floodplain and in stream channels and Lake Lavon. Sediment from the present sediment pool would be minimal because it would be protected from erosion.

- Alternative No. 2: Basically same as Alternative No. 1.

- Alternative No. 3A: The structures would store 169 acre-feet of sediment over the next 75-years. The capacity to store sediment would be increased in FRS No. 5A.

- Alternative No. 3B: The structures would store 169 acre-feet of sediment over the next 75-years. The capacity to store sediment would be increased in FRS No. 5A and would be 9.5 acre feet greater than Alternative 3B.

Page 25 (comment document pg 26) -

Land Values

- Present Conditions: There are 1,352 developed properties and 662 undeveloped properties adjacent to FRS Nos. 3D, 3E, and 5A sediment pools. The presence of the sediment pools and associated amenities has been a major factor in the development properties in the subdivisions. The properties located around the sediment pools have values ranging from $236,000 to $921,000. Remaining properties within the subdivisions are valued from $126,000 to $1.2 million. Construction of residences within the subdivision is proceeding at a rapid rate. Maintenance of upstream property values is dependent upon the presence of the dams.

Page 25 (comment document pg 27) -

Land Values

- Alternative No. 1: There are 146 properties currently valued at $52 million immediately adjacent to the sediment pools. The removal of the dams would cause the value of these properties to be reduced by 5 percent. [redacted] In addition, property not adjacent to the pools but located within the affected subdivisions (currently 1361 properties [redacted] with a market value of $394 million) would experience a 0.5 percent reduction in value. [redacted] The remaining 0.375% of their value if the dams were breached. [redacted] The effects to fair market value of these properties would see a reduction in value in the absence of the dams.

Page 32 (comment document pg 34) –

COMPARSION OF ALTERNATIVES

Table C compares each of the alternatives.

[redacted]

Page 38 (comment document pg 40) –

FINANCING ARRANGEMENTS

The installation of the project will be financed jointly by the City of McKinney and NRCS. NRCS will use funds appropriated for this purpose. The City of McKinney has approved a bond issue for its share of the costs.

The total estimated installation cost of the project is $3,289,715 ([redacted] Table 1). [redacted] Table 2 provides the Estimated Total Cost Distribution for the Project.

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LIST OF PREPARERS

Name & Present Title	Education	Experience (Years)
Allan Colwick, P.E., R.P.L.S., Watershed Specialist – Wilson & Company	B.S. Agricultural Engineer	42
Eugene Lindemann, P.E. – Senior Planner, Wilson & Company	Ph.D. Agricultural Engineering	41
Frank Sprague, Biologist – Wilson & Company	B.S. Wildlife Management	35
Calvin Sanders, Cultural Resources Specialist – NRCS	M.A. Anthropology	22
Charles Baird, P.E., Watershed Specialist – Wilson & Company	B.S. Agricultural Engineering	36
James Featherston, Agricultural Economist – NRCS	M.S. Agricultural Economics	27
Dave Petefish, Geologist – NRCS	M.S. Geology	28
David Strakos, Civil Engineering Technician – NRCS	High School Diploma	25
Scott Hoag, Agricultural Economist, Wilson & Company	M.S. Agricultural Economics	30
James Neighbors, Resource Conservationist - NRCS	M.S. Range Management	35
Pete Waldo, Geologist – NRCS	Ph.D. Mathematical Sciences	30
Ronnie Skala, P.E. Hydraulic Engineer – NRCS	B.S. Agricultural Engineering	24
Sam Stewart, Resource Conservationist – NRCS	[redacted]	36
Clyde Hogue, Resource Conservationist – NRCS	[redacted]	15
Charles Easterling, P.E., Director of Water Resources – Wilson & Company	M.S. Civil Engineering	30
Bonnie Simmons, Admin. Assistant – Wilson & Co.	A.A. Business Admin.	17
J.M. "Mike" Woodson, P.E., Watershed Specialist – Wilson & Company	B.S. Civil Engineering	40

[redacted]

In addition to the above named preparers, we would like to acknowledge the contributions of Ringley and Associates, Jim Goodrich, and Dr. John A. Dunbar and Dr. Peter M. Allen, Geology Department, Baylor University for their technical input into this project. We would also like to acknowledge the input of the Steering Committee for their valuable input into the planning of the project. [redacted]

Page 45 (comment document pg 47) –

APPENDIX C

[redacted]

BREACH INUNDATION MAPS

Page 47 (comment document pg 50) –

APPENDIX E

TABLE 1 - ESTIMATED INSTALLATION COST
FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas

(Trinity River Watershed)

(Dollars) [1/]

Installation Cost Item	Unit	Number	Estimated Cost (dollars)[1/, 2/] Federal Funds	Other Funds	Total
3D	No.	1	$ 548,307	$ 253,198	$ 801,505
3E	No.	1	$ 504,706	$ 233,063	$ 737,769
5A	No.	1	$1,197,472	$ 552,969	$1,750,441
Total Project			$2,250,485	$1,039,230	$3,289,715

1/ 2003 Prices.

2/ Federal Funds include NRCS Technical Assistance ($320,495), which is not included when calculating eligible federal cost share. Therefore, federal cost share is based on Estimated Total Project Cost of $2,969,220. [redacted]

Page 48 (comment document pg 51) –

APPENDIX E

TABLE 2 – ESTIMATED COST DISTRIBUTION – STRUCTURAL & NON-STRUCTURAL MEASURES
FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas
(Trinity River Watershed)
(Dollars) [1/]

	Installation Cost – Federal Funds				Installation Cost – Other Funds					
	Construction	Engineering	Project Admin.	Total Federal Funds [2/]	Construction	Engineering/ Planning	Real Property Rights	Project Admin	Total Other	Total Rehabilitation Cost
Rehabilitation of FRS Nn. 3D	$ 470,222	$ 44,620	$ 33,465	$ 548,307	$ 83,363	$ 134,835	0	$ 35,000	$ 253,198	$ 801,505
Rehabilitation of FRS No. 3E	$ 432,830	$ 41,072	$ 30,804	$ 504,706	$ 68,208	$ 134,855	0	$ 30,000	$ 233,063	$ 737,769
Rehabilitation of FRS No. 5A	$1,026,938	$ 97,448	$ 73,086	$1,197,472	$207,689	$ 170,780	$ 99,500	$ 75,000	$ 552,969	$ 1,750,441
Grand Total	$1,929,990	$ 183,140	$ 137,355	$ 2,250,485	$ 359,260	$ 440,470	$ 99,500	$ 140,000	$ 1,039,230	$ 3,289,715

1/ Price Base: 2003
2/ Federal Engineering Services and Project Administration costs are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Estimated Total Project Cost of $2,969,220.

[redacted]

Page 49 (comment document pg 52) –

Page 48 (comment document pg 51) –

APPENDIX E

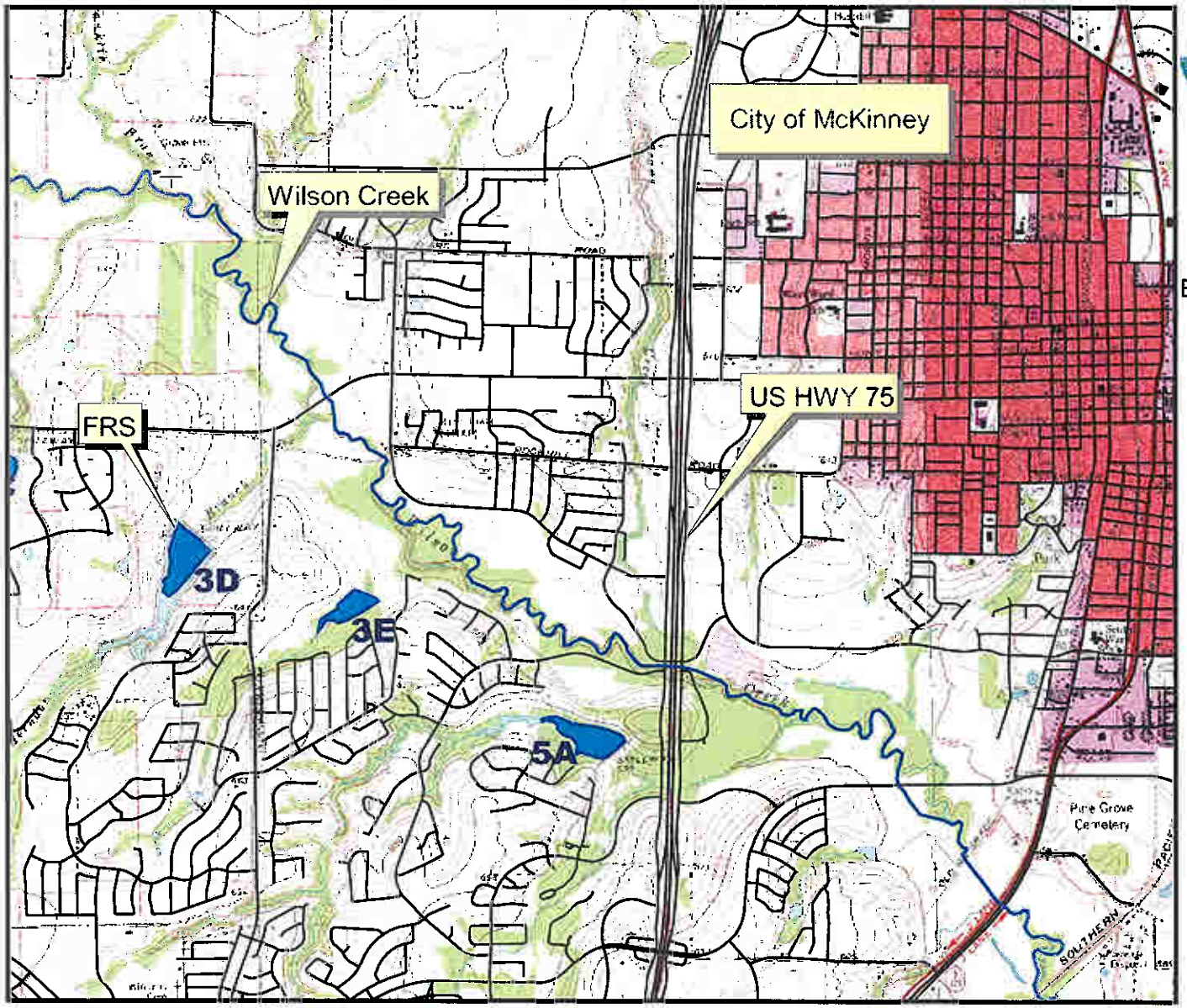
TABLE 3 – STRUCTURAL DATA – DAMS WITH PLANNED STORAGE CAPACITY FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas (Trinity River Watershed)

Item	Unit	FRS 3D	FRS 3E	FRS 5A
Class of structure		High	High	High
Seismic zone		1	1	1
Uncontrolled drainage area	sq mi	[redacted]	[redacted]	[redacted]
Runoff curve No. (1-day) (Average AMC)		78	76	80
Time of concentration (T_c)	hrs	0.76	0.53	1.04
Elevation top dam	ft	613.5	597.8	595.4
Elevation crest auxiliary spillway	ft	607.2	590.9	589.8

APPENDIX B

VICINITY MAP



NRCS Natural Resources Conservation Service

Vicinity Map

East Fork Above Lavon Watershed
of the Trinity River Watershed
FRS No. 3D, 3E & 5A
Collin County, Texas

N
W E
S

0.25 0 0.25 0.5 Miles

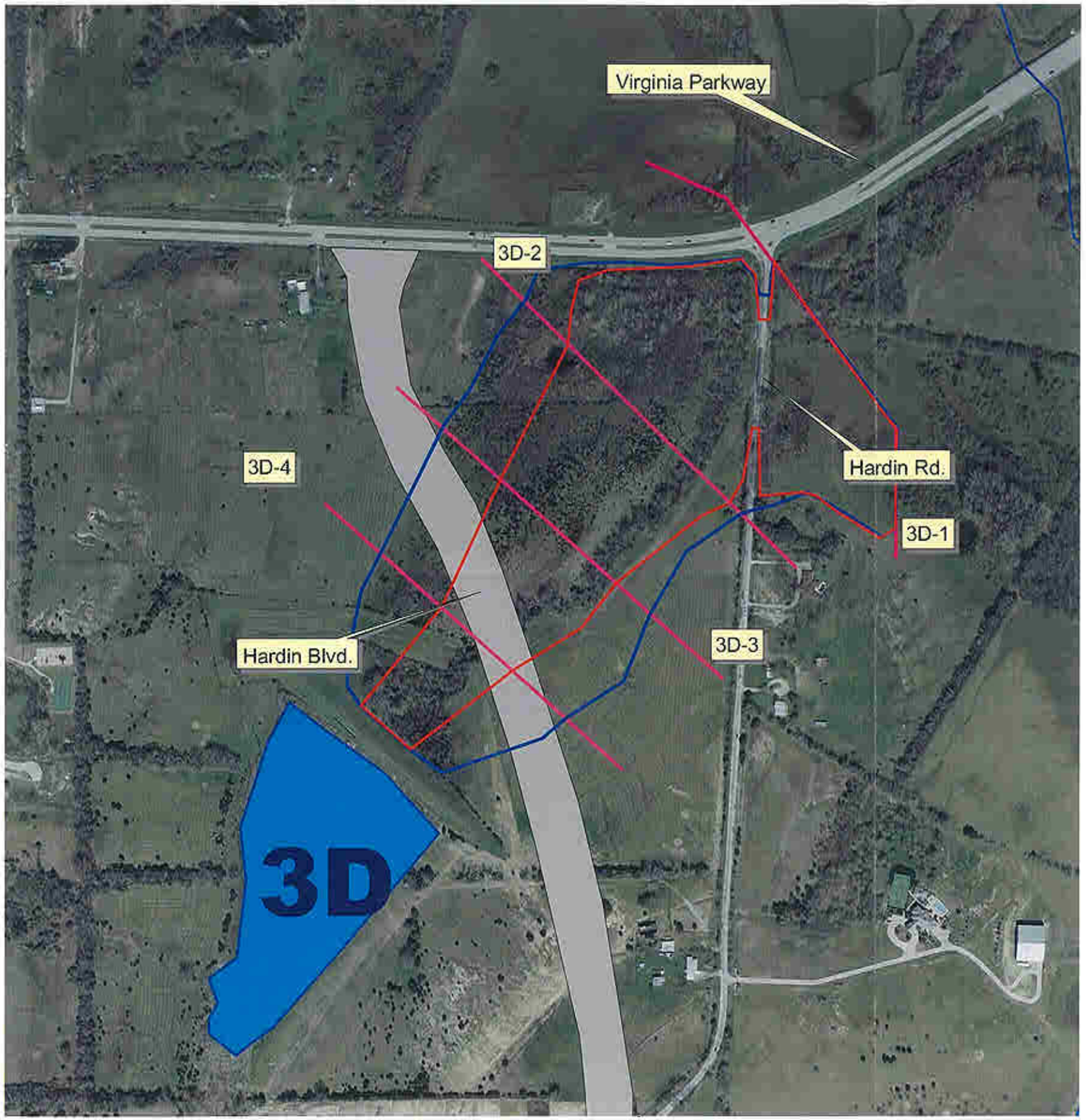
Scale 1" = 0.5 miles

April 2003

15

APPENDIX C

BREACH INUNDATION MAPS



NRCS Natural Resources Conservation Service

East Fork Above Lavon Watershed
of the Trinity River Watershed
Floodwater Retarding Structure No. 3D
Collin County, Texas

Breach Inundation Map

- 100 Year Floodplain (without Project)
- Breach Flood
- Valley Cross Sections
- New Hardin Blvd (under construction)

Breach Water Surface Elevations at Valley Cross Sections	
Valley Cross Section	Elevation (ft.) MSL
FRS Site 3D	613.0
3D-4	587.4
3D-3	582.9
3D-2	578.0
3D-1	572.7

N
W E
S

400 0 400 Feet

Scale 1" = 400'

May 2003

Note: The 100 Year Floodplain (without Project) on Wilson Creek equal or exceeds the Breach Flood downstream of the Site.

NRCS Natural Resources Conservation Service

East Fork Above Lavon Watershed
of the Trinity River Watershed
Floodwater Retarding Structure No. 3E
Collin County, Texas

Breach Inundation Map

100 Year Floodplain (without Project)
Breach Flood
Valley Cross Sections

Breach Water Surface Elevations at Valley Cross Sections

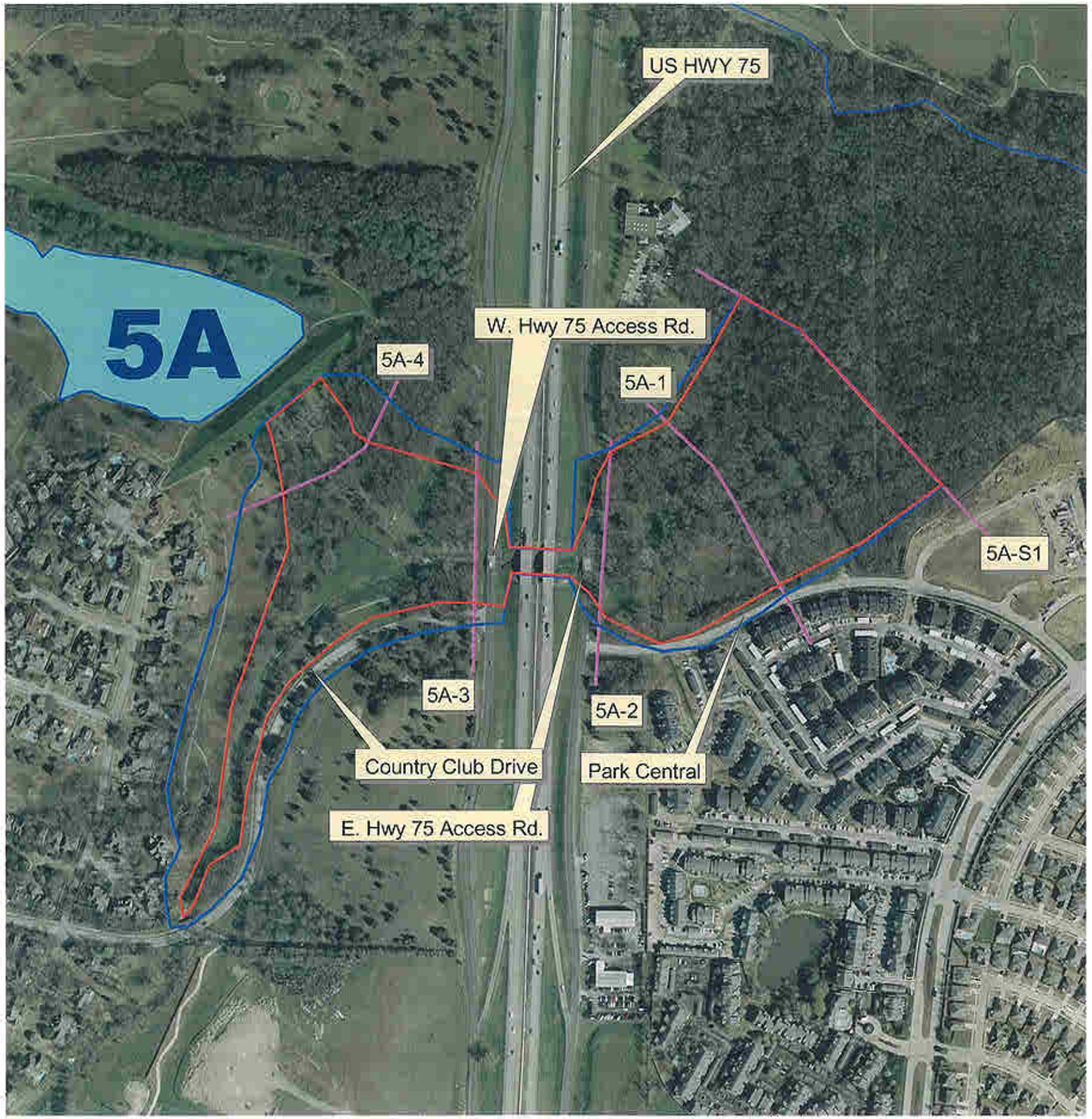
Valley Cross Section	Elevation (ft.) MSL
FRS Site 3E	597.4
3E-S4	571.1
3E-1	569.7
3E-S3	567.0
3E-W2	560.0
3E-W1	556.1

N
W E
S

500 0 500 Feet

Scale 1" = 500'

May 2003



NRCS Natural Resources Conservation Service

East Fork Above Lavon Watershed
of the Trinity River Watershed
Floodwater Retarding Structure No. 5A
Collin County, Texas

Breach Inundation Map

100 Year Floodplain (without Project)
Breach Flood
Valley Cross Sections

Breach Water Surface Elevations at Valley Cross Sections

Valley Cross Section	Elevation (ft.) MSL
FRS Site 5A	594.9
5A-4	578.6
5A-3	576.2
5A-2	562.9
5A-1	559.7
5A-S1	552.6

N
W E
S

400 0 400 Feet

Scale 1" = 400'

May 2003

APPENDIX D

PROJECT MAP

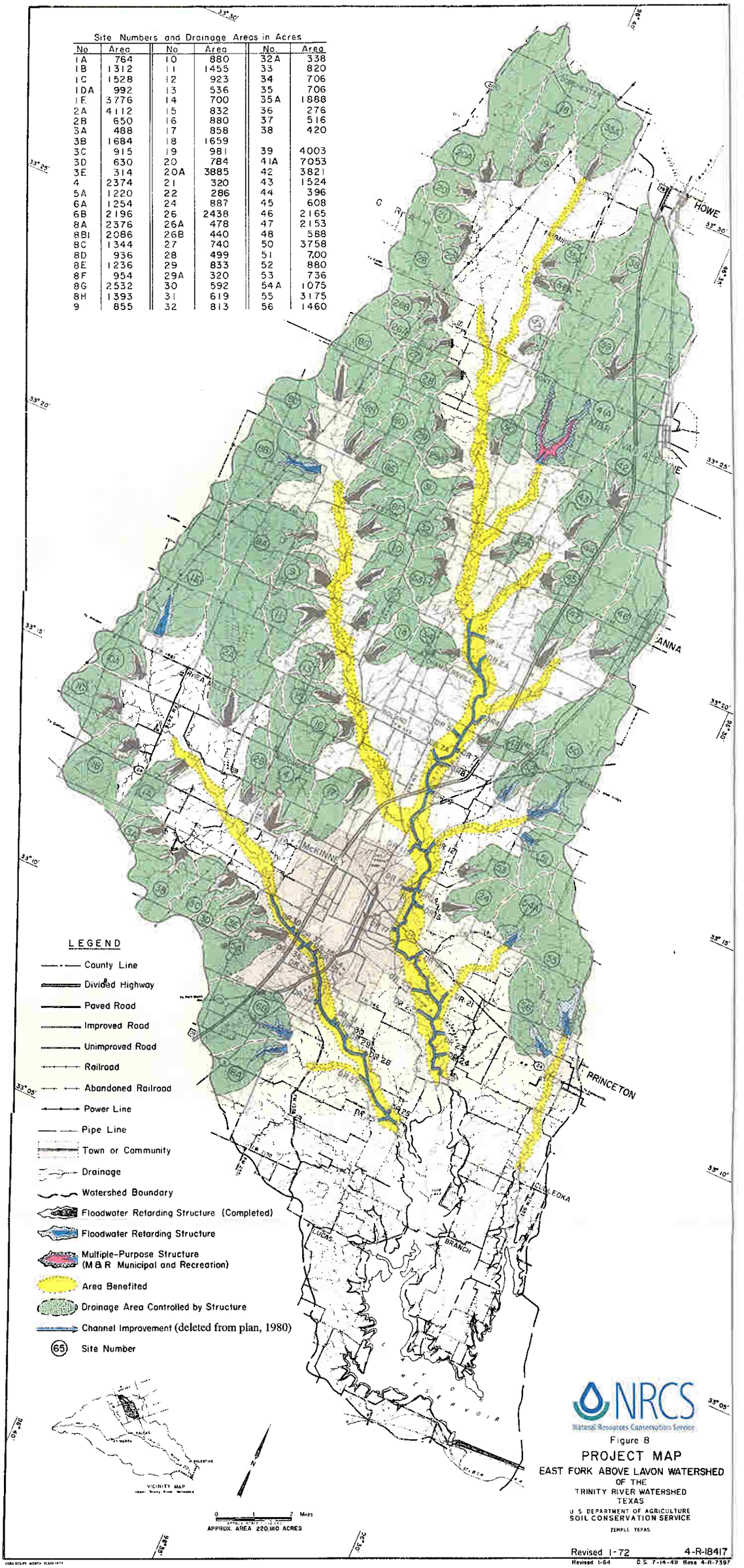


Figure 8

PROJECT MAP

EAST FORK ABOVE LAVON WATERSHED
OF THE
TRINITY RIVER WATERSHED
TEXAS

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
TEMPLE, TEXAS

Revised 1-72 4-R-18417
Revised 1-64 D.S. 7-14-49 Base 4-R-7397

S-14

APPENDIX E

TABLE 1 - ESTIMATED INSTALLATION COST
FRS NOS. 3D, 3E, and 5A
East Fork Above Lavon Watershed, Texas
(Trinity River Watershed)
(Dollars) [1/]

Installation Cost Item	Unit	Number	Estimated Cost (dollars)[1/, 2/]		
			Federal Funds	Other Funds	Total
3D	No.	1	$ 548,307	$ 253,198	$ 801,505
3E	No.	1	$ 504,706	$ 233,063	$ 737,769
5A	No.	1	$1,197,472	$ 552,969	$1,750,441
Total Project			$2,250,485	$1,039,230	$3,289,715

2003 Prices.
Federal Funds include NRCS Technical Assistance ($320,495), which is not included when calculating eligible federal cost share. Therefore, federal cost share is based on Estimated Total Project Cost of $2,969,220.

APPENDIX E

TABLE 2 – ESTIMATED COST DISTRIBUTION – STRUCTURAL & NON-STRUCTURAL MEASURES
FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas
(Trinity River Watershed)
(Dollars) [1/]

	Installation Cost ----------Federal Funds----------				Installation Cost ---------- Other Funds ----------					
	Construction	Engineering	Project Admin.	Total Federal Funds[2/]	Construction	Engineering/ Planning	Real Property Rights	Project Admin	Total Other	Total Rehabilitation Cost
Rehabilitation of FRS No. 3D	$ 470,222	$ 44,620	$ 33,465	$ 548,307	$ 83,363	$ 134,835	$ 0	$ 35,000	$ 253,198	$ 801,505
Rehabilitation of FRS No. 3E	$ 432,830	$ 41,072	$ 30,804	$ 504,706	$ 68,208	$ 134,855	$ 0	$ 30,000	$ 233,063	$ 737,769
Rehabilitation of FRS No. 5A	$1,026,938	$ 97,448	$ 73,086	$1,197,472	$207,689	$ 170,780	$ 99,500	$ 75,000	$ 552,969	$ 1,750,441
Grand Total	$1,929,990	$ 183,140	$ 137,355	$ 2,250,485	$ 359,260	$ 440,470	$ 99,500	$ 140,000	$ 1,039,230	$ 3,289,715

1/ Price Base: 2003

2/ Federal Engineering Services and Project Administration costs are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Estimated Total Project Cost of $2,969,220.

APPENDIX E

TABLE 3 – STRUCTURAL DATA – DAMS WITH PLANNED STORAGE CAPACITY FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas (Trinity River Watershed)

Item	Unit	FRS 3D	FRS 3E	FRS 5A
Class of structure		High	High	High
Seismic zone		1	1	1
Uncontrolled drainage area	sq mi	0.95	0.49	1.89
Runoff curve No. (1-day) (Average AMC)		78	76	80
Time of concentration (T_c)	hrs	0.76	0.53	1.04
Elevation top dam	ft	613.5	597.8	595.4
Elevation crest auxiliary spillway	ft	607.2	590.9	589.8
Elevation crest high stage inlet	ft	–	–	576.3
Elevation crest low stage inlet	ft	596.6	582.3	574.3
Auxiliary spillway type		Vegetated	Vegetated	Vegetated
Auxiliary spillway bottom width	ft	135	50	400
Auxiliary spillway exit slope	%	7	7	7
Maximum height of dam	ft	35	32	35
Volume of fill	cu yd	–	–	–
Total capacity [1/]	acre ft	240.5	94.2	393.6
Sediment submerged	acre ft	60.0	34.7	77.3
Sediment aerated	acre ft	7.2	2.9	8.2
Floodwater retarding	acre ft	233.3	91.3	385.3
Between high and low stage	acre ft	–	–	24.8
Surface area				
Sediment pool (Top of Riser)	acres	9.3	4.5	(14.3) [2/]
Floodwater retarding pool	acres	37.1	18.7	46.4
Principal spillway design				
Rainfall volume (1-day)	in	9.6	9.6	9.6
Rainfall volume (10-day)	in	16.0	16.0	16.0
Runoff volume (10-day)	in	10.44	10.08	10.89
Conduits				
Existing	type	concrete	[3/]	concrete
Diameter	in	17	[3/]	17
Capacity	cfs	11	[3/]	10
New	type	concrete	concrete	concrete
Diameter	in	30	30	60
Capacity of low stage	cfs	–	–	19
Capacity of high stage	cfs	124	102	505
Frequency operation-auxi. spillway	% chance	1.0	1.0	1.0
Auxiliary spillway hydrograph				
Rainfall volume	in	12.91	12.91	12.91
Runoff volume	in	10.05	9.77	10.33
Storm duration	hrs	6	6	6
Velocity of flow (V_e)	ft/s	7.8	8.7	8.3
Max. reservoir water surface elev.	ft	609.7	593.1	591.8
Freeboard hydrograph				
Rainfall volume	in	30.0	30.0	30.0
Runoff volume	in	26.9	26.5	27.2
Storm duration	hrs	6	6	6
Max. reservoir water surface elev.	ft	613.5	597.8	595.4
Discharge per ft of width (Q_e/b)	acre ft	7.6	10.5	5.1
Capacity equivalents				
Sediment volume	in	1.2	1.3	0.7
Floodwater retarding volume	in	4.6	3.5	3.8
Drawdown Time	Days	5.0	5.0	5.0

1/ Crest of auxiliary spillway.

2/ Sediment Storage between low and high stages will not initially store water – Water surface area at 574.3 is 10.6 acres.

3/ Existing principal spillway to be removed.

June/2003

APPENDIX E

TABLE 4 –ANNUAL COSTS
FRS NOS. 3D, 3E, and 5A
East Fork Above Lavon Watershed, Texas
(Trinity River Watershed)
(Dollars) [1/]

Evaluation Unit	Project Outlays		Total
	Amortization of Rehabilitation Cost [2/]	Operation, Maintenance and Replacement Cost	
FRS No. 3D	$ 45,746	$ 2,000	$ 47,746
FRS No. 3E	$ 43,949	$ 2,000	$ 45,949
FRS No. 5A	$ 104,274	$ 2,000	$ 106,274
Grand Total	**$ 195,968**	**$ 6,000**	**$ 201,968**

1/ Price base 2003
2/ Amortized for 75 years at 5.875 percent

APPENDIX E

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS
FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas
(Trinity River Watershed)
(Dollars) [1/]

Item	Estimated Average Annual Benefits [2/]
Floodwater	
Original Downstream Agricultural Damage Reduction [2/]	$ 31,400
Recreation Facilities and Participation [3/]	$ 1,988
TOTAL	**$ 33,388**

1/ Price Base: 2003 prices.

2/ Original downstream benefits updated using applicable indices.

3/ Reflects damage avoidance to downstream recreation facilities and public recreation use.

APPENDIX E

TABLE 6 - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES
FRS NOS. 3D, 3E, and 5A

East Fork Above Lavon Watershed, Texas (Trinity River Watershed)
(Dollars)

Item	Average Annual Benefits [1/]					Average Annual Cost [7/]	Benefit/Cost Ratio
	Original Downstream Benefits [2/6]	Property Values [3/]	Downstream Infrastructure [4/]	Recreation Facilities and Participation [5/]	Total Benefits		
FRS Nos. 3D	$ 9,100	$ 48,431	$ 47,656	$ 576	$105,763	$ 47,746	2.13
FRS No. 3E	$ 4,500	$ 75,655	$ 14,893	$ 288	$ 95,336	$ 45,949	2.07
FRS No. 5A	$17,800	$102,421	$ 74,867	$1,124	$196,211	$106,274	1.85
TOTAL	$31,400	$226,506	$137,416	$1,988	$397,310	$201,968	1.97

1/ All numbers reflect 2003 average annual dollars
2/ Updated using applicable indices.
3/ Reflects avoidance of upstream property devaluation.
4/ Reflects avoidance of downstream channel modification, construction cost for road and bridge modifications on FRS Nos. 3D and 5A modifying City's Storm Water Management Plan.
5/ Reflects damage avoidance to downstream recreation facilities and public recreation use.
6/ From Table 5
7/ From Table 4