



United States  
Department  
Of Agriculture

Natural  
Resources  
Conservation  
Service

**FINAL SUPPLEMENTAL  
WATERSHED PLAN No. III &  
ENVIRONMENTAL ASSESSMENT**  
For  
**Rehabilitation of Floodwater Retarding  
Structure No. 15**  
of the  
**Nolan Creek Watershed  
Bell County, Texas**

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Prepared By:  
U.S. Department of Agriculture  
Natural Resources Conservation Service

In Cooperation With:  
Central Texas Soil and Water Conservation District  
Bell County Water Control and Improvement District No. 6

MAY 2007

**FINAL**  
**Supplemental Watershed Plan No. III & Environmental Assessment**  
**For**  
**Rehabilitation of Floodwater Retarding Structure No. 15**  
**of the**  
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**AUTHORITY**

The original watershed work plan was prepared, and works of improvement have been installed, under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566) as amended. The rehabilitation of floodwater retarding structure No. 15 is authorized under Public Law 83-566 (as amended), and as further amended by Section 313 of Public Law 106-472

**ABSTRACT**

Historical floods in the past thirty-four years have caused the auxiliary spillway of Floodwater Retarding Structure No. 15 to function on at least one occasion with enough flow to float a 24-inch diameter tree 200-feet downstream of the auxiliary spillway during a storm event in the early 1990's. Urban development and increased traffic on a moderately heavy used highway (FM Road 93) downstream of the dam have caused concerns regarding the hydraulic capacity of the dam and human health and safety. As a result, the dam has been reclassified as a high hazard class (c) dam which fails to comply with current dam safety and performance criteria. Local project sponsors have chosen to rehabilitate the dam to address the identified safety deficiencies. The purposes of the proposed rehabilitation of floodwater retarding structure No. 15 are to maintain present level of flood control benefits and comply with current performance and safety standards. Rehabilitation of the site will require the following modifications to the structure: raise the top of the dam 2.7 feet, install an additional principal spillway, install a toe drain system, and widen the auxiliary spillway. Project installation cost is estimated to be \$1,043,600, of which \$757,700 will be paid from the Small Watershed Rehabilitation funds and \$285,900 from local funds.

**COMMENTS AND INQUIRIES**

Comments and inquires must be received by April 16, 2007. Submit comments and inquires to: Steven Bednarz, Assistant State Conservationist, Water Resources, USDA/NRCS, 101 South Main, Temple, Texas 76501 (254-742-9871).

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**SUPPLEMENTAL WATERSHED AGREEMENT NUMBER III**

Between the

**Central Texas Soil and Water Conservation District (Central Texas SWCD)**  
Local Organization

**Bell County Water Control and Improvement District No. 6 (Bell County WCID No. 6)**  
Local Organization

**(Hereinafter referred to as the Sponsoring Local Organizations)**

**and the**

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

Whereas, The Watershed Work Plan Agreement for Nolan Creek Watershed, State of Texas, executed by the Sponsoring Local Organization(s) named therein and the Service, became effective on the 9<sup>th</sup> day of April, 1963; and

Whereas, the Supplemental Watershed Work Plan Agreement for Nolan Creek Watershed, State of Texas, executed by the Sponsoring Local Organizations (SLO) named therein and the Service, became effective on the 30th day of December 1966; and

Whereas, the Supplemental Watershed Work Plan Agreement No. II for Nolan Creek Watershed, State of Texas, executed by the Sponsoring Local Organizations (SLO) named therein and the Service, became effective on the 20th day of August 1971; and

Whereas, in order to carry out the watershed work plan for said watershed, it has become necessary to modify said Watershed Work Plan Agreement; and

Whereas, in order to extend the watershed plan for said Floodwater Retarding Structure (FRS) No. 15 beyond its current evaluated life, it has become necessary to modify said watershed agreement; and

Whereas, the rehabilitation of said FRS No.15 has been authorized under the authority of the Watershed Protection and Flood Prevention Act (PL 83-566) as amended by the Watershed Rehabilitation Amendments (PL 106-472) provides the authority for rehabilitation; and

Whereas, it has become necessary to modify said watershed work plan by modifying Floodwater Retarding Structure (FRS) No. 15 to bring it up to current performance and safety standards and to extend the service life of the dam for an additional 100 years; and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Service; and

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

Now, therefore, the Secretary of Agriculture through the Service and the Sponsoring Local Organizations hereby agree upon the following modifications of the terms, conditions, and stipulations of said watershed agreement,

(1) Paragraph No. 2 is modified to read as follows:

The SLO's will acquire or provide assurance that landowners or water users have acquired such water, mineral, or other natural resources rights pursuant to State law as may be needed in the installation and operation of the works of improvement. Any costs incurred shall be borne by the sponsor and these costs shall not be considered part of the total cost when calculating any cost share.

(2) Paragraph No. 14 is added to the plan agreement with respect to the Rehabilitation of Floodwater Retarding Structure (FRS) No. 15:

The amount and percentages of the Total Eligible Project Cost to be paid by the Sponsoring Local Organization and the Service are as follows:

<u>Rehabilitation of</u>	<u>Sponsoring Local Organizations</u>	<u>Service</u>	<u>Total Eligible Project Cost</u>
FRS No.15	\$285,900 35%	\$531,000 65%	\$816,900 100%

The Service is responsible for the engineering services and project administration costs (\$226,700) it incurs. However, these costs are not used in the calculation of the federal cost share. Therefore, they are not included in Total Eligible Project Cost above. Also, costs of water, mineral and other resource rights, as well as federal, state and local permits are the responsibility of the Sponsoring Local Organizations and are not counted toward local cost share.

An amount up to the percentage rate specified may be satisfied by the Sponsoring Local Organizations for rehabilitation cost of an element such as engineering, real property acquisition or construction. The decision to, and arrangements for, such action will be negotiated between the Sponsoring Local Organizations and the Service and will be included in a project agreement executed immediately before implementation. The costs to the Service will not exceed 100 percent of the construction cost.

(3) Paragraph No. 15 regarding Operation and Maintenance (O&M) is added to the Plan Agreement as follows:

The SLO's will be responsible for the operation, maintenance, and any needed replacement of parts or portions of rehabilitated FRS No. 15 that have a service life of less duration than the program life (100 years) of the structure by actually performing the work or arranging for such work, in accordance with a new O&M Agreement. The new O&M agreement will be entered into before federal funds are obligated and continue for the program life. Although the SLO's responsibility to the Federal Government for O&M ends when the O&M Agreement expires, the SLO's acknowledge that continued liabilities and responsibilities associated with works of

improvement may exist beyond the program life. The O&M Agreement does not commit the Service to assistance of any kind beyond the end of the program life unless agreed to by all parties. Specifically, the Bell County WCID No. 6 will be responsible for the maintenance of rehabilitated FRS No. 15, and Bell County WCID No. 6 and the Central Texas SWCD will jointly be responsible for the operation of the structure.

(4) Paragraph No. 16 is added to the Plan Agreement as follows:

The Sponsoring Local Organizations agree to develop an Emergency Action Plan (EAP) before any rehabilitation construction activities begin stating the responsibilities for the development, implementation and review of actions necessary to provide safety to individuals downstream of FRS No. 15 should extreme flooding occur.

(5) Paragraph No. 17 is added to the Plan Agreement to include the most recent non-discrimination statement as follows:

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 795-6382 (TDD). USDA is an equal opportunity provider and employer.

(6) Paragraph No. 18 is added to include the most recent provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act as follows:

The sponsors hereby agree to comply with all of the policies and procedures of the Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 U.S.C. 4601 et. seq. as further provided by Uniform Relocation Assistance and Real Property Acquisition for Federally Assisted Programs, 49 CFR Part 24, and 7 C.F.R. Part 21) when acquiring real property interests for this federally assisted project. If the sponsor is legally unable to comply with the real property acquisition requirements of the Act, it agrees that, before any Federal financial assistance is furnished; it will provide a statement to that effect, supported by an opinion of the chief legal officer of the state containing a full discussion of the facts and law involved. This statement may be accepted as constituting compliance.

(7) Paragraph No. 19 is added to the plan agreement as follows:

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

(8) Paragraph No. 20 is added to read as follows:

The sponsors will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement. These costs shall not be considered part of the total cost when calculating any cost share.

(9) Paragraph No. 21 is added to the Plan Agreement with respect to Certification Regarding Drug-Free Workplace Requirements (7 CFR 3017, Subpart F) as follows:

By signing this Watershed Agreement, the sponsors are providing the certification set out below.

If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

*Controlled substance* means a controlled substance in Schedules I through V of the Controlled Substances Act (21 U.S.C. 812) and as further defined by regulation (21 CFR 1308.11 through 1308.15);

*Conviction* means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes;

*Criminal drug statute* means a Federal or non-Federal criminal statute involving the manufacturing, distribution, dispensing, use, or possession of any controlled substance;

*Employee* means the employee of a grantee directly engaged in the performance of work under a grant, including: (i) all direct charge employees; (ii) all indirect charge employees unless their impact or involvement is insignificant to the performance of the grant; and, (iii) temporary personnel and consultants who are directly engaged in the performance of work under the grant and who are on the grantee's payroll. This definition does not include workers not on the payroll of the grantee (e.g., volunteers, even if used to meet a matching requirement; consultants or independent contractors not on the grantees' payroll; or employees of sub-recipients or subcontractors in covered workplaces).

**Certification:**

A. The sponsors certify that they will or will continue to provide a drug-free workplace by:

- (1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;
- (2) Establishing an ongoing drug-free awareness program to inform employees about: –
  - (a) The danger of drug abuse in the workplace;
  - (b) The grantee's policy of maintaining a drug-free workplace;
  - (c) Any available drug counseling, rehabilitation, and employee assistance programs; and
  - (d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.
- (3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1);
- (4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee will:

(a) Abide by the terms of the statement; and

(b) Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

(5) Notifying the NRCS in writing, within ten calendar days after receiving notice under paragraph (4) (b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

(6) Taking one of the following actions, within 30 calendar days of receiving notice under paragraph (4) (b), with respect to any employee who is so convicted—

(a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or

(b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (1), (2), (3), (4), (5), and (6)

B. The sponsors may provide a list of the site(s) for the performance of work done in connection with a specific project or other agreement.

C. Agencies shall keep the original of all disclosure reports in the official files of the agency.

(10) Paragraph No. 22 is added to the Plan Agreement with regards to Certification Regarding Lobbying (7 CFR 3018) to read as follows:

(1) The sponsors certify to the best of their knowledge and belief, that:

(a) No Federal appropriated funds have been paid or will be paid, by or on behalf of the sponsors, to any person for influencing or attempting to influence an officer or employee of an agency, Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of

Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(c) The sponsors shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

(2) This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31, of the U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(11) Paragraph No. 23 is added to the Plan Agreement with regards to Certification Regarding Debarment, Suspension, and Other Responsibility Matters – Primary Covered Transactions (7 CFR 3017) to read as follows:

(1) The sponsors certify to the best of their knowledge and belief, that they and their principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

(2) Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this agreement.

The Sponsoring Local Organizations and the Service further agree to all other terms, conditions, and stipulations of said watershed agreement not modified herein.

**Central Texas Soil and Water Conservation District**

Local Organization

By Stanley J. Glass

Title Pres.

Date 5-15-07

The signing of this agreement was authorized by a resolution of the governing body of the Central Texas SWCD adopted at a meeting held on 5-15-07.

David Roberts  
(Secretary, Local Organization)

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**Bell County Water Control and Improvement District No. 6**

Local Organization

By [Signature]

Title President

Date 5-15-07

The signing of this agreement was authorized by a resolution of the governing body of the Bell County WCID No. 6 adopted at a meeting held on 5-15-07.

A.W. Smith  
(Secretary, Local Organization)

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**Natural Resources Conservation Service**  
**United States Department of Agriculture**

Approved By [Signature] **Acting**  
NRCS State Conservationist

Date May 31, 2007

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**SUPPLEMENTAL WATERSHED PLAN NO. III &  
ENVIRONMENTAL ASSESSMENT**

**SUMMARY OF SUPPLEMENTAL PLAN/ENVIRONMENTAL  
ASSESSMENT**

**Project Name:** Rehabilitation of Floodwater Retarding Structure (FRS) No. 15, Nolan Creek Watershed, Bell County, Texas

**Sponsoring Local Organizations (Sponsors):** Central Texas Soil and Water Conservation District (Central Texas SWCD) and the Bell County Water Control and Improvement District No. 6 (Bell County WCID No. 6)

**Description of Recommended Plan:** This alternative consists of leaving the existing drop inlet type principal spillway and connecting 18” pipe intact and adding a 30” diameter hooded inlet type principal spillway. Both principal spillway pipes will outlet into the same natural rock plunge basin. The crest elevation of the existing auxiliary spillway will be raised 0.3 foot to elevation 633.7 and the width will be widened by 20 feet. The top of the dam would be raised by 2.7 feet to elevation 641.1 and a foundation drain system will be installed along the back toe of the embankment. The auxiliary spillway will be vegetated and the embankment and auxiliary spillway will be fenced for livestock exclusion. The evaluated life of the structure will be extended for an additional 100 years.

**Resource Information:**

**Size of planning area:** 916 acres

<b>Land Cover</b>	<b>Acres</b>	<b>Percent</b>
Grassland	756	82.5
Miscellaneous	160	17.5
Total	916	100.0

<b>Land Ownership</b>	<b>Acres</b>	<b>Percent</b>
Private	769	84.0
State-Local	44	4.8
Federal	103	11.2
Total	916	100.0

**Number of farms in planning area:** 6

**Average farm size:** 110 Acres

**Prime and important farmland in planning area:** 4 Acres

**Number of minority farmers:** 0

**Number of limited resource farmers:** 0

**Project Beneficiary Profile:** The planning area is primarily comprised of agricultural land, with some residential development. The majority of the planning area is within the extra territorial jurisdiction (ETJ) of either the City of Belton or the City of Temple with additional future development anticipated. The reservoir is used for flood control and incidental recreational activities. Abandonment of the dam by excavating a breach section through the embankment would result in increased flood damages to downstream property, residences and roadways. The elimination of the reservoir would also result in a decrease of an estimated 100 recreational visitor days to the site. As such, private landowners, recreational users, local governments, and the State government are the primary beneficiaries of this project.

Approximately 50.1% of the population within Bell County is male and 49.9% is female. The 2003 per capita income for Bell County was \$26,412, compared to Texas per capita income of \$29,074 and \$31,472 for the United States. The population of the county is about 72 percent white, 23 percent black, about 1 percent American Indian, 3 percent Asian, and about 1 percent other racial groups. Ethnicity population within the county is 82 percent non-Hispanic and 18 percent Hispanic. Project area demographic information was assumed comparable to Bell County data.

**Wetlands:** FRS No. 15 provides approximately 15 acres of shallow and deep water palustrine (Cowardin Classification) habitat.

**Flood plains:** Approximately 44 acres are located downstream within the breach area of FRS No. 15.

**Highly erodible cropland:** None

**Fisheries:** A 15 surface acre sediment pool (palustrine – Cowardin Classification) and a downstream farm pond consisting of approximately 1.7 acres (palustrine – Cowardin Classification).

**Threatened and Endangered species:** Suitable habitat for any federally or state listed threatened or endangered species is not present.

**Cultural resources:** No historic properties are present in the planned project area (i.e. eligible for National Register of Historic Places).

**Problem Identification:** Residential development in the downstream watershed since FRS No. 15 was originally constructed has resulted in the dam not meeting current dam safety standards. Since a failure of the dam would result in potential loss of life and significant damage to downstream infrastructure and properties, both the Natural Resources Conservation Service (NRCS) and the State of Texas have reclassified the dam from low hazard to high hazard. Approximately 10 people downstream are at risk should the dam fail. This is a conservative figure, considering it is based only on people living within the breach area of FRS No. 15 and does not include motorists traveling on a roadway connecting Belton and Killeen downstream of the dam. The roadway and bridge within the breach area of the dam are specifically identified as FM Road 93 (FM 93), which had a 2005 average daily traffic count of 2,100 vehicles.

**Alternative Plans Considered:** Alternative plans considered are the (1) No Action or Future Without Project (controlled breach of FRS No. 15); (2) Decommission of FRS No. 15 (partial removal of FRS No. 15); (3) Rehabilitation of FRS No. 15 by raising the top of dam 2.7 feet, adding a new 30” diameter hooded inlet type principal spillway, leave existing 18 inch principal spillway pipe and riser in place, widening the auxiliary spillway by 20 feet, making minor modifications to the entrance section of the auxiliary spillway, and installing a toe drain system along the back slope of the embankment; and (4) Relocation of at-risk downstream properties located within breach area of the dam.

## **Brief Description of Each Alternative**

### **Alternative No. 1 – Future Without Project**

This alternative, which does not involve federal action, consists of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event. This breach would be a minimum size opening in the dam from top of dam down to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam except that a farm pond dam has been constructed across the channel approximately 1800 feet downstream of FRS No. 15. The farm pond would be subjected to significant erosion damage (probably damaged beyond repair by a 1 year storm event or larger) if a breach were excavated in the FRS No. 15 dam. Incidental fishing recreation benefits would be lost in the farm pond and FRS No. 15. This course of action would minimize the sponsor's dam safety liability but would not eliminate all liability. The material (about 35,000 cu yd) would be placed in the present easement area.

Since the 100-year floodplain would be enlarged due to the absence of flood protection, any potential future downstream development would be altered to account for the enlarged 100-year floodplain. Upstream land values could be negatively impacted by loss of lake property aesthetics and incidental recreational opportunities. The dam and land currently covered by the sediment pool would be maintained as a greenbelt area. The estimated cost of this alternative is \$301,900.

### **Alternative No. 2 - Decommission FRS No. 15.**

This alternative removes the storage function of the dam and reconnects, restores, and stabilizes the stream and floodplain functions. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam except that a farm pond dam has been constructed across the channel approximately 1800 feet downstream of FRS No. 15. The farm pond would be subjected to significant erosion damage (probably damaged beyond repair by a 1 year storm event or larger) if a breach were excavated in the FRS No. 15 dam. Incidental fishing recreation benefits would be lost in the farm pond and FRS No. 15. Partial removal of the embankment would consist of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event. This would eliminate the structure's ability to store water. In order not to impede flows through the breached embankment, the principal spillway components would also be removed. Excavated material (about 35,000 cu yd) would be placed in the sediment and detention pool areas and all exposed areas would be vegetated as needed for erosion control (about 10 acres). Riparian vegetation would be established along the stream channel (about 3 acres). Channel work would be installed to reconnect the stream

channel through the sediment pool. A grade stabilization structure would be installed to prevent head cutting and prevent sediment from being relocated to downstream areas.

Since the 100-year floodplain would be enlarged due to the absence of flood protection, any potential future downstream development would be altered to account for the enlarged 100-year floodplain. Adjacent land values could be negatively impacted by loss of lake property aesthetics and incidental recreational opportunities. The dam and land currently covered by the sediment pool would be maintained as a greenbelt area. Estimated cost of this alternative is \$807,500.

**Alternative No. 3 – Rehabilitation of FRS No. 15**

This alternative consists of leaving the existing drop inlet type principal spillway and connecting 18” pipe intact and adding a 30” diameter hooded inlet type principal spillway. The outlet pipes of both principal spillways would release their flows into a common, natural rock plunge basin. The crest elevation of the existing auxiliary spillway would be raised by 0.3 foot, the bottom width would be widened by 20 feet, minor modifications to the entrance section of the auxiliary spillway would be made, and the entire auxiliary spillway would be topsoiled and vegetated as part of the rehabilitation of FRS No. 15. A foundation drain system would be installed along the back toe of the embankment. The top of the dam would be raised by 2.7 feet to elevation 641.1. The embankment and auxiliary spillway would be fenced for livestock exclusion. Modifications to FRS No. 15 would insure compliance with current safety and performance standards. The evaluated life of the structure would be extended for an additional 100 years. The 100-year floodplain downstream of FRS No. 15 would be unchanged. Incidental recreation benefits would be maintained. Upstream and downstream land values would not be affected by the project. Estimated cost is \$1,043,600.

**Alternative No. 4 – Relocation of At-Risk Downstream Properties**

This alternative consists of relocating four downstream properties that would be at-risk due to a catastrophic breach of FRS No. 15 at an estimated cost of \$828,000. The relocation of these at risk properties would maintain the low hazard classification of FRS No. 15. In order to ensure that future downstream development would not include inhabitable at-risk structures, this alternative consists of purchasing deed restrictions on all remaining land within the breach zone at an estimated cost of \$82,300. In order for FRS No. 15 to meet current safety and performance standards for a low hazard structure, foundation drains costing \$70,000 would be installed. After accounting for administration costs of \$51,600, total estimated cost of this alternative is \$1,031,900.

**Project Purpose:** Flood Prevention.

**Principal Project Measure:** Rehabilitation of FRS No. 15.

<b>Project Costs:</b>	<u>Federal funds</u>	<u>Other Funds</u>	<u>Total</u>
	\$757,700	\$285,900	\$1,043,600

**Project Benefits:** Economic benefits of the project are derived from assuring the continued performance of FRS No. 15 by meeting current performance and safety standards. Benefits are based on continuing flood protection to the downstream area, maintaining property values, maintaining incidental recreation opportunities, and avoiding projected costs associated with

implementing Alternative No. 1. Total average annual benefits are estimated to be \$74,700, which include updated original downstream benefits (\$49,500), maintaining property values (\$6,900), maintaining incidental recreation opportunities (\$3,300), and saving the sponsors the consequences of a controlled breach (\$15,000). Also, the risk of loss of life (about 10 residents located within the breach area and motorists traveling on downstream roadways) from a dam failure would be minimized.

**Other Impacts:** Recreational opportunities associated with FRS No. 15 would not only be maintained, but could be enhanced due to a quicker draw-down time of the detention pool following storm events due to the presence of the additional principal spillway. Debris clean-up after major storm events could be done sooner, thus allowing recreational opportunities to commence sooner.

**Environmental Values Changed or Lost:** No compensatory mitigation is planned. Installation of the preferred alternative will disturb only a minimal amount of grassland and juniper vegetation and will have only a temporary impact on the sediment pool and water quality. After the installation of the additional principal spillway, the sediment pool will return to the preconstruction size and elevation, and all disturbed areas will be replanted with adapted native and/or introduced grasses. Installation of the preferred alternative will not have a significant adverse impact on environmental values, including wildlife habitat and water quality.

**Major Conclusions:** Rehabilitation of FRS No. 15 would minimize the risk of loss of life within the breach area, allow the continuance of flood prevention and incidental recreational benefits, and maintain both upstream and downstream property values.

**Areas of Controversy:** There are no known areas of controversy.

**Issues to be Resolved:** Any discharge of dredged or fill material in a water of the US associated with rehabilitation of FRS No. 15 would require a Department of the Army permit under Section 404 of the Clean Water Act of 1972. Also, for projects with disturbances equal to or greater than five acres it is necessary to have a Storm Water Pollution Prevention Plan (SWPPP) in place at least 48 hours prior to and during construction of the proposed project and filing a Notice of Intent with the Texas Commission on Environmental Quality is required. A Notice of Termination (NOT) must be filed once the site has reached final stabilization. The sponsors will be responsible for developing an Emergency Action Plan (EAP) prior to construction and will review and update the EAP annually with local emergency response officials.

## **PURPOSE AND NEED FOR ACTION**

### **INTRODUCTION**

Within the Nolan Creek Watershed major changes in land use from a rural setting to an urban setting has occurred in large portions of the watershed. This land use change has occurred upstream and downstream of most of the floodwater retarding structures in the Nolan Creek Watershed. The Texas Commission on Environmental Quality (TCEQ) and the NRCS have mutually determined that Nolan Creek Watershed FRS No. 15 is a high hazard structure based on current criteria. The auxiliary spillway has functioned at least once in the past with one particular storm event in the early 1990's producing a large enough flow to float a 24" diameter tree over the control section and deposit it several hundred feet downstream in the auxiliary spillway. There are human health and safety concerns about the performance of this dam.

When Nolan Creek Watershed was planned, the original intent of the floodwater retarding structures was to protect downstream agricultural areas of the watershed and urban areas of Killeen and Belton. The economy in the Nolan Creek Watershed area was almost entirely agricultural (cropland and grassland) when the original planning was completed; however, forty-five years later, the expansion of nearby Fort Hood Military Reservation has caused urban sprawl to consume much of the watershed. As a result, the population of Killeen has increased from just over 23,000 in 1962 to more than 100,200 in 2005. Belton has also experienced growth during this time, from about 8,200 to over 15,500. Several other smaller communities within the watershed have experienced similar growth patterns. The economy, land use, and population growth within the Nolan Creek Watershed have been heavily influenced because of its proximity to the Fort Hood Military Reservation. Population growth in Bell County is projected to increase from 256,000 in 2005 to 282,500 by 2015, an increase of over 10%.

FRS No. 15 is located within the ETJ of Belton and the area downstream of the site is in the ETJ of Temple. The watershed for FRS No. 15 heads along U.S. Highway 190, a major thoroughfare between Belton and Killeen; and FM 93, another significant transportation route between the two cities, is located approximately 900 feet downstream of the dam. As a result of the unpredicted population growth within the Nolan Creek Watershed, FRS No. 15 needs to be upgraded to meet current performance and safety standards and ensure continued protection of the watershed and the lives of people downstream.

### **PURPOSE AND NEED FOR THE PROJECT**

This Supplemental Watershed Plan/Environmental Assessment was prepared to implement the rehabilitation of FRS No. 15. FRS No. 15 was originally installed under the authority of the Watershed Protection and Flood Prevention Act of 1954 (PL83-566) as amended. The rehabilitation of FRS No. 15 is authorized under Public Law 83-566 (as amended), and as further amended by Section 313 of Public Law 106-472.

The purposes of the FRS No. 15 rehabilitation project are to maintain present level of flood control benefits and comply with the current performance and safety standards. FRS No. 15 was built in 1972 in a rural setting and is now strongly influenced by high population growth and land development due to continued expansion of nearby Fort Hood Military Reservation. In particular, there are four residences and a moderately heavily used roadway, FM 93, downstream

that would be impacted by a dam failure of FRS No. 15. This risk of loss of life has caused the dam to be reclassified as a high hazard dam. Rehabilitation of FRS No. 15 is needed to protect downstream properties and infrastructure, and reduce the risk of loss of life. The rehabilitation of FRS No. 15 would ensure the service life of the dam for a minimum of 100 additional years.

## **WATERSHED PROBLEMS AND OPPORTUNITIES**

The primary concern is the safety of FRS No. 15 and the potential problems that failure of the dam would cause. Approximately 10 people living downstream of FRS No. 15 are at risk should the dam fail. This estimate does not include motorists that might be traveling on FM 93 which is located approximately 900 feet downstream of the dam. FM 93 would be affected by a breach of the dam should it overtop and fail. The basic objective of the project is to provide continued flood protection and reduce the risk of loss of human life.

Currently FRS No. 15 is functioning as originally planned and providing downstream flood damage protection from the 25-year, 24-hour storm, however there is a possibility of the dam failing from overtopping if a storm occurs greater than the structure was constructed to control. Total estimated damages from a catastrophic breach of FRS No. 15 would approach \$500,000 and the risk of loss of human life would be significant.

Following is a list of opportunities that would be realized through the implementation of this watershed rehabilitation plan:

- Comply with current dam safety criteria
- Protect human health and safety
- Protect infrastructure and transportation system
- Maintain flood control benefits and prevent increased flooding in the floodplain
- Maintain or improve water quality
- Protect fish and wildlife habitats
- Maintain incidental recreational opportunities

## **SCOPE OF THE 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.

Table A presents the results of the scoping process:

<i><b>Table A – Identified Concerns</b></i>			
<b>Economic, social, environmental, and cultural concerns</b>	<b>Degree of Concern</b>	<b>Degree of Significance to Decision Making</b>	<b>Remarks</b>
Dam Safety	High	High	
Human Health & Safety	High	High	
Flood Damages	High	High	
T&E Species	Low	Low	No Impact
Cultural Resources	Low	Low	No Impact
Prime Farm Lands	Low	Low	Minimal Impact
Wetlands	Low	Low	
Air Quality	Low	Low	
Water Quality	Medium	Medium	
Water Quantity	Medium	Medium	
Aesthetics	Low	Low	
Sedimentation and Erosion	Medium	Medium	
Land Values	High	High	
Fish & Wildlife Habitat	Medium	Medium	
Recreation	High	High	

## **AFFECTED ENVIRONMENT**

This Supplemental Plan/Environmental Assessment is for the watershed upstream of FRS No. 15 and the downstream area affected by a breach of the existing dam (Appendix C). FRS No. 15 was constructed on an un-named tributary of Nolan Creek approximately 1 mile below the confluence of North Nolan Creek and South Nolan Creek and about 9 miles above the confluence of Nolan Creek and the Leon River. The Nolan Creek and Leon River watersheds are located in the Brazos River Basin. A description of the Nolan Creek Watershed can be found in the Nolan Creek Watershed Work Plan dated December 1962.

The rehabilitation project area of FRS No. 15 consists of 872 drainage acres and 44 acres in the downstream breach zone for a total of 916 acres. The project area is located within the ETJ of the City of Belton and the City of Temple, Bell County, Texas. Land uses within the rehabilitation project area include residential, commercial, lakes, highways, grazing lands, and open areas.

## **EXISTING CONDITIONS**

### **Original Project**

The Nolan Creek Watershed Plan was approved for operation in April 1963 under the authority of Public Law 83-566, as amended. The plan provides for application of conservation practices for watershed protection and flood prevention. The local Sponsors are the Central Texas SWCD and Bell County WCID No. 6. Federal assistance was provided by the United States Department of Agriculture (USDA), Soil Conservation Service (now the Natural Resources Conservation Service or NRCS). A total of twelve FRS were planned and constructed during 1966 through 1972. One additional FRS, FRS No. 2, was constructed by the Department of Defense on the Fort Hood Military Reserve in 1961. Two previous supplements to the original 1963 plan have been prepared and approved.

### **Description of Existing Dam**

FRS No. 15 was originally designed and constructed in 1972 as a low hazard class (a) dam, a hazard classification given to dams that do not pose a threat to loss of life. It was constructed as a zoned earth fill embankment, consisting of silty clay, gravelly clay, caliche, and a continuous blanket of limestone rock spalls and fines over the entire dam. The auxiliary spillway has a 100 foot bottom width and has a minimum thickness of 9 inches of rock riprap on the bottom and side slopes. The principal spillway is an 18-inch diameter reinforced concrete pipe connected to a 2-foot by 6-foot by 19-foot inlet with a crest elevation of 620.2. The inlet structure has a 12" gated outlet with an invert elevation of 601.6 to facilitate lowering the permanent water level for repairs and maintenance. The original sediment pool consisted of a 15-acre lake containing 146 acre feet of capacity. There were no foundation drains planned or installed when FRS No. 15 was originally constructed. During the planning process for rehabilitation of FRS No. 15, geologic investigations indicated that foundation drains are needed and will be planned along the back toe of the embankment. The total storage capacity below the elevation of the auxiliary spillway is 523 acre-feet with 157 acre-feet reserved for sediment accumulation over a 50-year period. The remaining 366 acre-feet is reserved for floodwater detention storage. The maximum height of the dam is 47 feet. The surface area of the current sediment pool is about 15 acres according to the 2005 topographic survey. FRS No. 15 was constructed as a low hazard dam designed to store the sediment expected to accumulate over a 50-year period and provide floodwater storage. Sufficient floodwater detention storage was provided for a 4 percent chance of the auxiliary spillway functioning in any year (25-year, 24 hour storm).

The embankment is in excellent condition. The continuous limestone rock spall outer layer of the embankment and auxiliary spillway has provided a stable, non-erosive surface for the past 34 years. King Ranch Bluestem has voluntarily established into a partial stand in the auxiliary spillway. The embankment and auxiliary spillway have never been fenced to prevent livestock exclusion due to existence of rock blanket on surface. No brush or trees are allowed to grow on the embankment. The inlet and principal spillway were visually inspected and an internal camera was used to inspect the conduit. Both are in excellent condition. The dam has no stability or foundation problems; however a seep area in the middle to lower section of the auxiliary spillway and a small seep area downstream of the back toe on the left abutment are present.

The presence of FRS No. 15 provides for recreational activities in the form of fishing and other associated water sports. A conservative estimate for these activities is about 100 visitor days per year.

**Existing Structural Data:**

Table B shows the existing structural data for Nolan Creek Watershed FRS No. 15:

Year Completed	1972
Drainage Area	872 acres
Stream	Un-named tributary of Nolan Creek
Purposes	Flood Prevention, Watershed Protection
Dam Type	Zoned Earthfill
Dam Height	47 feet (ft.)
Dam Volume	108,740 cubic yards
Dam Crest Length	2024 ft. (excluding auxiliary spillway)
Sediment	157 acre-feet
Flood	366 acre-feet
Principal Spillway:	
Type	Reinforced Concrete
Inlet Height	21.0 ft. <sup>1/</sup>
Conduit Size	18 inches
Auxiliary Spillway:	
Type	Rock Riprap
Width	100 ft.
Principal Spillway Crest	620.2 ft. MSL (North American Datum 1927 [NAD27])
Auxiliary Spillway Crest	633.4 ft. MSL (NAD27)
Top of Dam (Minimum Crest)	638.4 ft. MSL (NAD27)

<sup>1/</sup> Overall height 21.0 feet, inside dimensions 2 feet by 6 feet by 19 feet.

**Physical Features and Environmental Factors**

**Project location:** The Nolan Creek Watershed, located in Bell County, Texas, is comprised of 73,600 acres (about 115 square miles). Of this total, the drainage area for FRS No. 15 is 872 acres (about 1.36 square miles). The watershed heads along US Highway 190 approximately 4 miles west of the intersection of US Highway 190 and Interstate Highway 35, Bell County, Texas. Nolan Creek Watershed FRS No. 15 is located at Latitude, decimal degree 31.07 and Longitude, decimal degree -97.51. The watershed is located within the Brazos River Basin as delineated by the United States Water Resources Council, hydrologic unit number 12070201.

**Topography:** The project area lies within the gently rolling hills along the eastern extreme of the Lampasas Cut Plain Physiographic Area. Topography ranges from gently sloping to sloping and undulating to rolling in the upland areas and is nearly level along the alluvial valleys.

**Soils and Geology:** Soils in the vicinity of the FRS No. 15 dam, spillway, and reservoir area are typical of those found in the Speck-Tarrant-Purves soil association. The moderately sloping to steep uplands contain Brackett association and Speck association soils while the narrow, irregularly shaped area along the un-named tributary below the dam contains Lewisville silty clay soils, (USDA, March 1977). After the confluence of the un-named tributary and Nolan Creek, the alluvial soil in the valley is Frio silty clay, frequently flooded.

FRS No. 15 is located on the Comanche Peak and Walnut Clay formations of Lower Cretaceous Age. The limestone of the Comanche Peak caps the abutments while the Walnut Clay is found in the lower valley section. The Comanche Peak and Walnut Clay consist of hardness 3-4 limestone with a few hardness 5 layers. With depth, there is an increase in the hardness 1-3 and thickness of the claystone layers.

The alluvial materials generally consist of upper moderate to highly plastic, medium to stiff consistency, light reddish brown to brown to black, silty clays underlain by very slight to slightly plastic, light gray brown, stiff consistency clays. Some thin sandy and gravelly channels occur within the light brown, lower clays.

A deep alluvial channel cuts across the upper right abutment and intersects the emergency spillway. The sand and gravel lenses transmit water from the permanent pool to the lower emergency spillway.

**Climate:** Average annual rainfall is slightly less than 34 inches. Normal temperatures range from an average high of 97 degrees Fahrenheit in August to an average low of 36 degrees in January. The normal freeze-free period of 260 days extends from March 9 to November 24.

**Cultural Resources:** No prior cultural resources identification activities have been conducted in the FRS No. 15 project area. The dam and reservoir were constructed in 1972, prior to implementation of the National Historic Preservation Act and other historic preservation laws that now require NRCS (Soil Conservation Service at that time) to consider effects to significant cultural resources.

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 Bell County, Texas (NPS 2006).

A search of the Texas Archeological Sites Atlas, completed in October 2006 did not reveal any recorded archeological or historic sites in the vicinity of the proposed project (THC 2006). NRCS and the Texas State Historic Preservation Officer (SHPO) have agreed that a cultural resources survey should be completed on all areas of new disturbance associated with potential rehabilitation measures. Accordingly, the NRCS cultural resources specialist conducted a survey of areas of potential new disturbance associated with the prospective rehabilitation alternative at FRS No. 15 in October 2006. These areas have been subject to various disturbances associated with original construction and other activities including farming/ranching practices, roads, trails, and recreational facilities.

No cultural resources were found in the areas of potential new disturbance associated with rehabilitation measures at FRS No. 15 and overall there appears to be low potential for subsurface cultural deposits in these areas.

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 the alternative resulting in rehabilitation of FRS No. 15. This determination was reported to the SHPO in December 2006 for review and concurrence (letter on file). The SHPO concurred in the determinations on December 18, 2006 (letter on file).

It should be noted that additional cultural resources investigations would be necessary should the no action or decommissioning alternatives be selected. At this time, areas of potential effect for alternatives other than rehabilitation have not been specifically identified.

**Prime Farmland:** Soils in the project area were evaluated by the USDA-NRCS in accordance with requirements of the Farmland Protection Policy Act (FPPA). The proposed project area impacted by the rehabilitation of FRS No. 15 does contain Important Farmland as defined by the FPPA (4 acres Prime and Unique Farmland; 0 acres Statewide/Local Important), however the total soil index score of 77, utilizing the land evaluation and site assessment form AD-1006, was less than the 160 point threshold and “need not be given further consideration for protection” [7 CFR 658.4 (c) 2]. Completed forms and a letter documenting this determination are on file.

**Fish and Wildlife Resources:** FRS No. 15 is located within the ETJ of Belton in Bell County, Texas in a watershed that is currently experiencing significant development upstream. The structure provides approximately 15 acres of deep water and shallow water habitat. Land use adjacent to the east side of the structure is private undeveloped lands used primarily for livestock grazing. The land cover is predominantly poor condition rangeland with a predominance of vegetation that is limited to low quality annual and perennial cool and warm season grasses, forbs and invading brush species. Land use adjacent to the west and north of the structure is small acreage home sites. FRS No. 15 currently provides habitat for small mammals, neo-tropical songbirds, shore birds, various water fowl, and a variety of fish species. Various species of reptiles and amphibians also inhabit the project site.

**Threatened and Endangered Species:** According to information provided by the U.S. Fish & Wildlife Service (USFWS), there are three species federally listed as endangered and one species federally listed as threatened in Bell County, Texas. The Texas Parks and Wildlife Department lists an additional three species as endangered and two species as threatened by the state.

Investigations by NRCS biologists identified no individuals or suitable habitat for any species federally or state listed as threatened or endangered. The proposed project would have no effect on threatened or endangered species.

Table C shows the Federally and State Listed Threatened and Endangered Species for Bell County:

Common Name	Scientific Name	Species Group	Federal Status	State Status
Arctic Peregrine Falcon	<i>Falco peregrinus tundris</i>	Birds		T
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Birds	T	T
Black-capped Vireo	<i>Vireo atricapilla</i>	Birds	E	E
Golden-cheeked Warbler	<i>Dendroica chrysoparia</i>	Birds	E	E
Interior Least Tern	<i>Sterna antillarum athalassos</i>	Birds		E
Peregrine Falcon	<i>Falco peregrinus</i>	Birds		E
Whooping Crane	<i>Grus americana</i>	Birds	E	E
Red Wolf	<i>Canis rufus</i>	Mammals		E
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	Reptiles		T

**Wetlands:** The pool area of Nolan Creek FRS 15 is a palustrine, unconsolidated bottom, permanently flooded, diked/impounded wetland system (PUBHh), with a palustrine, unconsolidated shore, temporarily flooded, diked/impounded system (PUSAh) where the ephemeral stream enters the pool according to information provided by the National Wetland Inventory Map for the Nolanville Quadrangle (USDI, 1990). The National Wetland Inventory Map also shows a palustrine, emergent, persistent, semi-permanently flooded, diked/impounded area (PEM1Fh) on the east side of the sediment pool. The sediment pool is approximately 15 acres in size and is at an elevation of approximately 620 feet above sea level. For the purpose of the National Wetland Inventory Maps, all water bodies visible on aerial photography that are less than 20 acres in size are considered to be in the palustrine system unless depth information is available or an active wave-formed or bedrock shoreline feature is visible. FRS No. 15 provides approximately 15 acres of shallow and deep water habitat. Riverine (ephemeral) and palustrine wetland systems exist upstream and downstream of Nolan Creek FRS 15. In particular, an agricultural pond classified as a palustrine, unconsolidated bottom, semi-permanently flooded, diked/impounded wetland system (PUBFh) is located downstream of the structure. These areas are considered wetland systems under the Cowardin classification system (Classification of Wetlands and Deepwater Habitats of the United States, 1979, by Cowardin, Lewis M. et al.) and do not meet the definition of a wetland under the Clean Water Act of 1972.

## **STATUS OF OPERATION AND MAINTENANCE**

Bell County WCID No. 6 will be responsible for the maintenance of FRS No. 15. Bell County WCID No. 6 and the Central Texas SWCD will jointly be responsible for the operation of the structure. Inspections of the dam indicated that the dam is being operated and maintained properly. Bell County prevents development from encroaching upon the 100-year floodplain.

The dam is in excellent condition. A one foot thick rock blanket covers the front and back slopes of the dam, and the auxiliary spillway has a minimum of 9 inches of rock riprap on the side slopes and bottom. The inlet structure and principal spillway were visually inspected and an internal camera was used to inspect the conduit. Both are in excellent condition.

## **SEDIMENTATION**

Investigations indicate that the dam, including the principal spillway, is structurally sound and is being properly maintained. The sediment survey and predictive soil loss equations completed in 2005, indicates that there are well over 100 years of available sediment storage capacity remaining below elevation 620.2 (lowest ungated outlet). The accumulated sediment in the sediment and detention storage areas was not tested as it will not be disturbed during the rehabilitation of the FRS No. 15.

The original planned total sediment volume was 157 ac-ft or 3.14 ac-ft/yr. This volume was broken down as follows: 146 ac-ft in the sediment pool (below elevation 620.2, lowest ungated outlet), and 11 ac-ft of aerated sediment storage in the detention pool (above elevation of 620.2).

The 2005 sediment survey showed an accumulation of 15.9 ac-ft of sediment volume indicating that the actual sediment rate was 0.48 ac-ft /yr. The survey also indicated that 132.8 ac-ft of volume remained below the sediment pool elevation of 620.2 (available for future sediment storage). The fine-grained rocks and soils, gentle topography and stable land use suggest comparatively low sedimentation rates. With the continued change in land use from agricultural to a rural urban interface, the estimated future sediment rate is calculated to be 0.48 ac-ft per year which is the same as the actual for the past 34 years. The rehabilitation design of FRS No. 15 is for an evaluated life of 100 years. The remaining available sediment volume is 132.8 ac-ft (below elevation 620.2). The sediment volume needed for the 100 year evaluated life of the rehabilitated structure is 44.8 ac-ft submerged and 3.6 ac-ft aerated for a total of 48.4 ac-ft.

## **BREACH ANALYSIS AND HAZARD CLASSIFICATION**

Nolan Creek Watershed FRS No. 15 does not meet current dam design and safety requirements. The dam was originally constructed in 1972 as a class (a) low hazard structure for the purpose of protecting downstream agricultural lands from flooding. Exceptional population growth in the area since 1972 has dramatically changed the land use to predominately suburban. As a result of this population growth, four residences and one roadway are now at risk from a catastrophic breach of FRS No. 15.

The NRCS hazard classification now identifies this dam as a class (c) high hazard structure. The Texas Commission on Environmental Quality, Safe Dams Program, has agreed on the reclassification of the structure to “high hazard”. The high hazard classification is based on the risk of loss of life concerning at-risk residences and a moderately heavy used highway located in the downstream dam breach flood zone area. FRS No. 15 has been identified as a high hazard dam as a result of (1) four at-risk residences in the area that would be affected by a breach of the dam, and (2) FM 93, located downstream, a well used transportation route between Nolanville, Belton, and Killeen.

Breach studies indicate that FM 93 would be overtopped by approximately seven feet if the dam failed, resulting in property and infrastructure damages. Even though about 2,100 vehicles utilize it daily, FM 93 is not considered a major highway, and its location within the breach area did not have a main effect on reclassification of FRS No. 15.

The four residential properties downstream of the dam would be at-risk in the event of a breach, resulting in about 10 lives being endangered. The breach floodwaters would reach and inundate the first floor elevations of two residences at a depth (up to 3.6 feet) and velocity that would

cause major structural damages and possibly even remove the houses from their foundations. Anybody inside of the houses at this time would face an extremely dire predicament. The other two houses would be surrounded by floodwaters and the first floors inundated to about 0.5 feet. Even though depth of floodwaters would be minimal inside the latter two homes, the velocity and uncertainty of the debris-laden floodwaters could result in unexpected and irrational reactions by the occupants, thus putting themselves in a dangerous situation.

Although the structure is presently sound, there is always the risk of failure. The most likely cause of FRS No. 15 failing is by overtopping. 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 37,500 cubic feet per second (cfs). Fair weather conditions were assumed to develop the breach hydrograph. The reservoir pool elevation was static at top of dam with non-storm conditions downstream. See Appendix C, Breach Inundation Map and Appendix D, Investigation and Analysis, Hydrology.

## **POTENTIAL MODES OF DAM FAILURE**

Both NRCS and the State of Texas recognize that Nolan Creek Watershed FRS No. 15 is now a high hazard dam. Several potential modes of failure were examined as follows:

**Sedimentation** – Sediment can be deposited in both the sediment pool (the area below the principal spillway crest) and flood detention pool (the area between the principal spillway crest and the auxiliary spillway crest). When the sediment pool has filled to the elevation of the principal spillway inlet, the pool no longer has permanent water storage. As the detention pool loses storage due to sediment deposition, the auxiliary spillway operates, or has flowage, more often and is therefore subject to erosion. A potential mode of failure exists as the auxiliary spillway continues to degrade, and depth and frequency of flow increases. The dam will ultimately breach.

FRS No. 15 was designed with a 50-year sediment storage life. A reservoir sediment survey was conducted in 2005. The sediment survey and predictive soil loss equations indicate that while some sediment has accumulated, FRS No. 15 has sufficient storage capacity remaining for at least another 100 years. With the change in upstream land use, the projected sediment load was decreased dramatically. Future sediment load is expected at the same rate or less as the land use continues to change from agricultural to urban. Therefore, in the near future, sedimentation presents a low potential mode of failure for FRS No. 15.

**Hydrologic Capacity** – Hydrologic failure of a dam can occur by breaching the auxiliary spillway or overtopping the dam during a storm event. The integrity and stability of the auxiliary spillway is dependent on the depth, velocity, and duration of flow; the vegetative cover; and the spillway's resistance to erosion. The integrity and stability of the embankment during overtopping is dependent on the depth, velocity, and duration of flow; the vegetative cover; and the embankment's resistance to erosion.

FRS No. 15 was originally designed to temporarily store the runoff from 7.39 inches of rain falling in 6 hours plus an additional 4.4' of elevation without overtopping the embankment. Current criteria require FRS No. 15 to temporarily store the Probable Maximum Precipitation (PMP) storm of 30.6" in 6 hours without overtopping the embankment. The PMP storm is the maximum design storm required by the State of Texas Dam Safety Office. The possibility of a storm of this magnitude occurring is very low, but if it does occur, the current auxiliary spillway

will perform at greater depths for longer durations and the dam will overtop. These conditions could lead to the possible breaching of the auxiliary spillway, the embankment or both. FRS No. 15 is currently performing as originally designed and is expected to continue to perform into the future; however it does not meet current dam safety design criteria for a high hazard dam. Therefore, the potential for FRS No. 15 to fail due to a deficiency in hydrologic capacity is judged to be high.

**Seepage** – Seepage is the primary geotechnical concern on FRS No. 15. Embankment and foundation seepage can contribute to failure of an embankment by removing (piping) soil material through the embankment or foundation. As the soil material is removed, voids can be created, allowing ever increasing amounts of water to flow through the embankment or foundation until the dam collapses due to the internal erosion. Seepage that increases with an increase in pool elevation is an indication of a potential problem, as is stained or muddy water. Foundation and embankment drainage systems can alleviate the seepage problem by removing the water without allowing soil particles to be transported away from the dam.

FRS No. 15 shows visible signs of minor seepage along the toe of the dam on the left abutment and another seep exists in the downstream area of the auxiliary spillway. No sloughing or any other indications of embankment instability were noticed and there are no indications that these conditions will cause the embankment to fail in the future. FRS No. 15 is protected with a cover of rock, and no trees are present on the embankment sections. Therefore, in the near future, seepage presents a low potential mode of failure for FRS No. 15.

**Seismic** – The integrity and stability of an earthen embankment are dependent on the presence of a stable foundation. Foundation movement through consolidation, compression, or lateral movement can cause the creation of weak zones or voids within an embankment, separation of the principal spillway conduit joints, or in extreme cases, complete collapse of the embankment.

FRS No. 15 is located in the Algermissen Seismic Zone 0. There are no indications that any foundation movement has occurred in the past that would weaken the integrity of the embankment or any of the components of the structure and none is anticipated in the future. Seismic activity creates only a very small potential as a mode for failure of FRS No. 15.

**Embankment Slope Failure** - An embankment slope failure allows increased saturation and weakens the integrity of the dam during the PMP and could result in a catastrophic failure. Slope failure can also create slides and sloughing that lower the top of dam elevation so that overtopping may occur during the PMP.

FRS No. 15 shows no visible signs of slope failure or sloughing or any other noticeable indications of instability on the embankments. The embankments of FRS No. 15 are protected with a cover of rock and no trees are present on the embankments. Therefore, embankment slope failure presents a low potential mode of failure for FRS No. 15, but it should continue to be monitored in the future.

**Material Deterioration** - Material used in the principal spillway system and fences are normal, common construction materials, but they are subject to weathering and chemical reaction due to natural elements within the soil, water, and atmosphere. Concrete components can deteriorate and crack, metal components can rust and corrode, and leaks can develop. Embankment failure can occur from internal erosion caused by these leaks.

Based on available information and field observations, the structure appears to be in extremely good condition with no evidence of deterioration on any of the materials that would require structural repair at this time. A pipe inspection video of the existing principal spillway conduit was viewed to assess the condition of the existing conduit. The conduit appears to be in excellent condition. As a result, the potential failure of the existing dam due to deteriorating components is judged to be low. However, due to the age of the existing structural components, FRS No. 15 should continue to be monitored annually and after significant storm events.

## CONSEQUENCES OF DAM FAILURE

All of the structural components of the dam are in very good condition. The dam does not meet current safety standards for a dam in this location and there is a risk of the dam failing from overtopping. An analysis of the dam indicated that a storm of the (PMP) would overtop the dam. The risk of dam failure is low but the consequences of such a failure if it were to occur would likely be catastrophic.

Four residential properties downstream of the dam would be at-risk in the event of a breach, resulting in about 10 people being subjected to the risk of loss of life. The breach floodwaters would reach the first floor elevations of all residences, and depth and/or velocity of floodwaters would cause residents' lives to be endangered.

If the dam fails, FM 93, a well used traffic thoroughfare between Nolanville, Belton, and Killeen would be overtopped by approximately seven feet of water at a maximum velocity of ten feet per second (Table D). All vehicles on FM 93 would be washed downstream and the road surface would be damaged and impassable. Traffic would be disrupted while the roadway was being repaired. Table D shows the effects of a breach of FRS No. 15 on the downstream crossing:

<i>Table D – Effects of Breach of FRS No. 15 to Downstream Crossing</i>		
<b>Downstream Crossing</b>	<b>Depth Over Crossing (ft)</b> <i>1/</i>	<b>Daily Traffic Count (#)</b>
FM 93	7	2,100
<i>1/</i> Maximum velocity for identified crossing is approximately 10 feet per second.		

Total estimated damages from a catastrophic breach of FRS No. 15 would approach \$500,000. As a result of a breach approximately 20,000 cubic yards of fill material from the dam would move downstream, clogging stream channels and increasing flooding on roads and bridges.



**FM 93 looking westward. A breach of FRS No. 15 would overtop FM 93 by 7 feet which is approximated by the tip of the yellow arrow.**

## **ALTERNATIVES**

### **FORMULATION PROCESS**

A 100-year evaluated life was established as well as a 100-year period of analysis. All alternatives were planned to function for a minimum of 100-years with proper maintenance. Alternatives are eligible for financial assistance under the Watershed Protection and Flood Prevention Act (PL 83-566) as amended by the Watershed Rehabilitation Amendments of 2000 (Public Law 106-472). To be eligible for federal assistance, an alternative must meet the requirements as contained in the Watershed Rehabilitation Amendments of 2000.

The Future Without Project 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. Bell County WCID No. 6 is the entity that owns the easements for the dam, and is responsible for determining what action to take if the dam is not brought up to current performance and safety standards.

Based on conditions set forth by the Future Without Project baseline, present conditions were developed. The dam does not meet current safety standards for a dam in this location and there is a risk of the dam failing from overtopping. An analysis of the dam indicated that the PMP would overtop the dam. Appendix C shows the area that will be flooded if the dam breached under fair weather conditions.

Failure of the dam would result in significant damage and risk of loss of life. If the dam fails Bell County WCID No. 6 would then be liable for the downstream damages. Bell County WCID No. 6 considered the following options in deciding the most likely course of action:

- Modify the dam to comply with current safety standards with Federal assistance.
- Modify the dam to comply with current safety standards without Federal assistance.
- Take no action and accept the risk of the dam failing sometime in the future.
- Breach the dam to eliminate the risk of failure from a catastrophic storm event.

After considering the options, Bell County WCID No. 6 decided that their best option in the absence of Federal assistance is to breach the dam 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 dam.

Alternatives eligible for financial assistance under The Watershed Protection and Flood Prevention Act (PL 83-566) 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.

### **ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY**

A wide range of non-structural and structural measures were considered singly and in combination as alternatives were formulated. Non-structural measures included flood plain management, liability insurance, zoning, flood warning systems, flood proofing of properties,

and installation of storm water detention structures. These non-structural alternatives were either cost prohibitive or did not meet the purpose of the project.

Several structural measures were considered but eliminated from detailed study. These included decommissioning of the dam by total removal of the embankment, raising the dam and installing a roller compacted concrete (RCC) spillway on top of the dam, and increasing the capacity of the auxiliary spillway.

Decommissioning of the dam by total removal of the embankment was eliminated due to cost considerations. Project costs associated with raising the top of the dam and installing an RCC spillway on top of the dam would far outweigh benefits from this alternative. And, the alternative to provide increased capacity of the auxiliary spillway was eliminated due to inability to provide enough width at the existing site location. Location of a home and FM 93 adjacent to the existing auxiliary spillway restricted this alternative from being feasible.

## **DESCRIPTION OF ALTERNATIVE PLANS**

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

### **Alternative No. 1 – No Action or Future Without Project**

Under this alternative, no additional federal funds would be expended on the project. This alternative consists of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event with no influence on the water surface profile. This breach would be a minimum size opening in the dam from top of dam down to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam, except that a farm pond dam has been constructed across the channel approximately 1800 feet downstream of FRS No. 15. The farm pond would be subjected to major erosion damage (estimated to be damaged beyond repair by a 1 year storm event or larger) if a breach were excavated in the FRS No. 15 dam. Incidental fishing recreation benefits would be lost in the farm pond and FRS No. 15. This course of action would minimize the sponsor's dam safety liability but would not eliminate all liability. The excavated material (about 35,000 cu yd) would be placed in the present easement area. The remaining portion of the embankment and the land currently covered by the sediment pool would be maintained as a greenbelt area. Land values upstream of the dam would be negatively impacted by loss of lake property aesthetics and incidental recreational opportunities.

Since the 100-year floodplain would be enlarged due to the absence of flood protection, any potential future downstream development would be altered to account for the enlarged floodplain. Without the presence of FRS No. 15, floodwaters from a 100-year storm event would overtop FM 93 by about 2.5 feet causing moderate road damage and interrupting traffic until repairs could be made. According to Texas Department of Transportation (TXDOT) officials, there are no planned upgrades or improvements to FM 93 in the foreseeable future. The estimated cost of this alternative is \$301,900.

### **Alternative No. 2 - Decommission FRS No. 15**

This alternative removes the storage function of the dam and reconnects, restores, and stabilizes the stream and floodplain functions. Although complete removal of the embankment is sometimes required for decommissioning, a partial removal of the embankment would take place. Partial removal of the embankment would consist of

excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event with no influence on the water surface profile. This would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam, except that a farm pond dam has been constructed across the channel approximately 1800 feet downstream of FRS No. 15. The farm pond would be subjected to major erosion damage (estimated to be damaged beyond repair by a 1 year storm event or larger) if a breach were excavated in the FRS No. 15 dam. Incidental fishing recreation benefits would be lost in the farm pond and FRS No. 15. Since the 100-year floodplain would be enlarged due to the absence of flood protection, any potential future downstream development would be altered to account for the enlarged 100-year floodplain. Land values upstream of the dam would be negatively impacted by loss of lake property aesthetics and incidental recreational opportunities. The remaining portion of the embankment and land currently covered by the sediment pool would be maintained as a greenbelt area. Excavated material (about 35,000 cu yd) would be placed in the sediment and detention pool areas and all exposed areas would be vegetated as needed for erosion control (about 10 acres). Riparian vegetation would be established along the stream channel (about 3 acres). Channel work would be installed to reconnect the stream channel through the sediment pool. A grade stabilization structure (GSS) would be installed to prevent head cutting and prevent sediment from being relocated to downstream areas.

In order not to impede flows through the breached embankment, the principal spillway components would be removed. Removal of the components would also insure that visitors would not be subject to injury by climbing on or around the exposed components. Without the presence of FRS No. 15, floodwaters from a 100-year storm event would overtop FM 93 by about 2.5 feet causing moderate road damage and interrupting traffic until repairs could be made. According to Texas Department of Transportation (TXDOT) officials, there are no planned upgrades or improvements to FM 93 in the foreseeable future. The estimated cost of this alternative is \$807,500.

### **Alternative No. 3 – Rehabilitation of FRS No. 15**

This alternative consists of modifying FRS No. 15 to meet current performance and safety standards for a high hazard dam. The modification will consist of rehabilitation of FRS No. 15 by raising the top of dam 2.7 feet to elevation 641.1, leaving the existing 2-foot by 6-foot by 19-foot drop inlet type principal spillway and connecting 18-inch pipe intact, and adding a new 30-inch hooded inlet type principal spillway at the same elevation as the existing principal spillway. The outlet pipes of both principal spillways will discharge into the same natural rock plunge basin. Foundation drains will be installed along the back toe of the embankment. The crest elevation of the existing auxiliary spillway will be raised 0.3 foot and the bottom width will be widened by 20 feet. The auxiliary spillway will be topsoiled and vegetated and the embankment and auxiliary spillway would be fenced for livestock exclusion. Because of the additional principal spillway, floodwater detention storage will be provided for a 1 percent chance of the auxiliary spillway functioning in any year (100-year frequency). The evaluated life of the structure would be extended for an additional 100 years. The 100-year floodplain downstream of FRS No. 15 would be unchanged. Incidental recreation benefits would be maintained. Upstream and downstream land values would not be affected by the project. Estimated cost of this alternative is \$1,043,600.

**Alternative No. 4 – Relocation of At-Risk Downstream Properties.**

Because four inhabitable properties are located downstream of FRS No. 15 within the breach inundation area, relocation of properties at-risk at a cost of \$828,000 was included as an alternative. The relocation of these at risk properties would maintain the low hazard classification of FRS No. 15. Bell County WCID No. 6 is familiar with the provisions as set forth by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (42 U.S.C. 4601 et seq.), and would be responsible for ensuring such provisions are met. Four families (approximately 10 people) would be relocated out of the breach area to other areas of the county. The area acquired by the WCID would be maintained as a greenbelt area. The existing 100-year floodplain would not change. However, in order to ensure that future downstream development would not include inhabitable at-risk structures, this alternative also consists of purchasing deed restrictions on all remaining land within the breach zone at an estimated cost of \$82,300. Upstream property values, as well as fisheries and wildlife resources, would be maintained. In order for FRS No. 15 to meet current safety and performance standards for a low hazard structure, foundation drains costing \$70,000 would be installed. After accounting for administration costs of \$51,600, total estimated cost of this alternative is \$1,031,900.

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 (NED) plan. During the process of formulating alternatives, the NED alternative was determined to be one of the four alternatives listed above.

## COMPARSION OF ALTERNATIVES

Table E compares effects of each of the alternatives:

<i>Table E – Comparison of Effects of Alternatives</i>				
Resource Concerns	Alternative No. 1 Future Without Project	Alternative No. 2 Decommission FRS No. 15	Alternative No. 3 Rehabilitation of FRS No. 15	Alternative No. 4 Relocate at-risk Properties
<b>NED Account <sup>1</sup></b>				
Project Investment	\$301,9000	\$807,500	\$1,043,600	\$1,031,900
Annual Benefits	\$0	\$15,000	\$74,700	\$69,900
Annual Costs	\$0	\$40,200	\$53,300	\$53,700
Net Benefits	\$0	(\$25,200)	\$21,400	\$16,200
<b>EQ Account <sup>2</sup></b>				
Wetlands	16.7 acres adversely impacted.	16.7 acres adversely impacted.	Temporarily impacted during construction activities.	No effect.
Prime Farm Lands	No effect.	No effect.	Minimal effect to about 4 acres.	No effect.
Water Quality	Increased sediment loads will occur downstream.	Efforts will be made to stabilize existing sediment and to prevent headcutting.	Impacts will be of a temporary nature during construction in accordance with state laws.	Impacts will be of a temporary nature during relocation activities.
Water Quantity	Loss of the sediment pool (15 acres) and downstream pond (1.7 acres).	Loss of the sediment pool (15 acres) and downstream pond (1.7 acres).	Maintain permanent water in sediment pool (15 acres).	Maintain permanent water in sediment pool (15 acres).
Sedimentation and Erosion	Minor erosion during construction. Sediment pool converted to open area.	Minor erosion during construction. Sediment pool converted to open area.	Minor erosion during construction. 8 acres disturbed during construction.	Minor erosion during relocation activities. 4 acres disturbed during relocation activities.
Air Quality	Minor adverse during construction.	Minor adverse during construction	Minor adverse during construction.	Minor adverse during relocation activities.
Fish and Wildlife Habitat	Conversion of 15 acres of shallow and deep water habitat to riverine habitat. Area would be vegetated through natural regeneration and maintained as a greenbelt area. Possible conversion of 1.7-acre downstream pond to riverine habitat.	Conversion of 15 acres of shallow and deep water habitat to riverine habitat. Area would be vegetated to native species preferred by resident wildlife species. Possible conversion of 1.7-acre downstream pond to riverine habitat.	Fish and wildlife habitat maintained.	Fish and wildlife habitat maintained.
Threatened & Endangered Species	No effect	No effect	No Effect	No Effect
<b>RED Account <sup>3</sup></b>				
Land Values	Values will be negatively affected in upstream and downstream areas, but no effect to region.	Values will be negatively affected in upstream and downstream areas, but no effect to region.	Values maintained in upstream and downstream areas with no effect to region.	Values maintained in upstream area with no effect to region.

<b>Resource Concerns</b>	<b>Alternative No. 1 Future Without Project</b>	<b>Alternative No. 2 Decommission FRS No. 15</b>	<b>Alternative No. 3 Rehabilitation of FRS No. 15</b>	<b>Alternative No. 4 Relocate at-risk Properties</b>
<b>OSE Account <sup>4</sup></b>				
Aesthetics	Area covered by sediment pool would be maintained as a greenbelt area.	Area covered by sediment pool would be maintained as a greenbelt area.	Total of 8 acres affected by construction activities, of which 4 acres would be reseeded.	Area acquired downstream would be maintained as a greenbelt area.
Dam Safety	Threat of dam failure would be removed.	Threat of dam failure would be removed.	Threat of dam failure is reduced.	Threat of dam failure would remain.
Flood Damages	Downstream flood damages would increase.	Downstream flood damages would increase.	Continued protection from flooding.	For relocated properties, flood damages eliminated. Continued protection from flooding for other properties.
Human Health and Safety	Reduced threat to loss of life. More frequent flooding.	Reduced threat to loss of life. More frequent flooding.	Reduced threat to loss of life. Increased flood protection.	Reduced threat to loss of life.
Recreation	Loss of activities due to loss of sediment pool and farm pond. Greenbelt area could provide recreational opportunities.	Loss of activities due to loss of sediment pool and farm pond. Greenbelt area could provide recreational opportunities.	Recreation opportunities maintained.	Recreation opportunities maintained. Greenbelt area could provide recreational opportunities.
Cultural Resources	Potential effect if cultural resources present	Potential effect if cultural resources present	No effect	Potential effect if cultural resources present

<sup>1</sup> NED – National Economic Development: Sponsors would incur \$301,900 cost in the absence of federal action. This annualized cost (\$15,000) is included instead as a benefit for Alternatives 2, 3, and 4 since it would not be incurred if any alternative except number one were adopted.

<sup>2</sup> EQ – Environmental Quality

<sup>3</sup> RED – Regional Economic Development

<sup>4</sup> OSE – Other Social Effects

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

<b>Item</b>	<b>Alternative No. 1 Future Without Project</b>	<b>Alternative No. 2 Decommission FRS No. 15</b>		<b>Alternative No. 3 Rehabilitation of FRS No. 15</b>		<b>Alternative No. 4 Relocate at-risk Properties</b>	
	Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits
Original Damage Reduction Benefits <sup>2/</sup>	\$0	\$0	\$0	\$49,500	\$49,500	\$49,500	\$49,500
Maintain Property Values	\$0	\$0	\$0	\$6,900	\$6,900	\$2,100	\$2,100
Maintain Incidental Recreation Benefits	\$0	\$0	\$0	\$3,300	\$3,300	\$3,300	\$3,300
Avoidance of Consequences of Sponsor's Breach	\$0	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
<b>Total</b>	<b>\$0</b>	<b>\$15,000</b>	<b>\$15,000</b>	<b>\$74,700</b>	<b>\$74,700</b>	<b>\$69,900</b>	<b>\$69,900</b>

<sup>1/</sup> All numbers reflect 2006 prices.

<sup>2/</sup> Updated using applicable indices and updated data. Although the level of protection is greater with Alternative No. 3 compared to Alternative No. 4, difference in benefits is insignificant.

## ENVIRONMENTAL CONSEQUENCES

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 described to provide a better understanding of the effects.

### **DAM SAFETY**

- **Present Conditions** – The dam does not meet current safety standards for a dam in this location and there is a risk of the dam failing from overtopping. An analysis of the dam indicated that a storm of the PMP would overtop the dam. The risk of dam failure is low but the consequences of such a failure if it were to occur would likely be catastrophic. A breach study was made to determine the effects of a one time catastrophic breach of the existing dam. The breach of the existing dam was considered to be overtopping of the dam with a breach as wide as the maximum height of the dam. The flow from the breach would overtop FM 93 with approximately 7 feet of water at a maximum velocity of 10 feet per second.
- **Alternative No. 1** - The threat of the dam failing would be removed through a controlled breach of the dam thereby eliminating any concern for dam safety. With FRS No. 15 in place, the 100-year storm currently overtops the roadways and bridge crossings downstream of FRS No. 15. Therefore, no further modifications would be expected due to an enlarged floodplain.
- **Alternative No. 2** - The threat of the dam failing would be removed by decommissioning the dam and removing a portion of the embankment by a controlled breach. Other conditions as described in Alternative No. 1 would apply.
- **Alternative No. 3** - The risk of the dam failing from overtopping would be reduced by raising the effective height of the dam thereby reducing the threat of a catastrophic breach.
- **Alternative No. 4** - Relocation of the at-risk properties downstream would remove danger to occupants of the structures. The threat of a breach from over topping would remain.

### **HUMAN HEALTH & SAFETY**

- **Present Conditions** – Although the dam is structurally safe, there is a threat of failure from overtopping by the occurrence of a PMP storm. There is a significant threat to human life and safety from dam failure. Four residences downstream of FRS No. 15 would be affected by a breach, endangering 10 people. The breach of FRS No. 15 would overtop FM 93 potentially endangering the lives of motorists.
- **Alternative No. 1** - No threat from failure. However, potential threat from flooding would increase.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - Threat to human life and safety from a dam failure would be reduced. Flood protection would continue for residents and motorists downstream of FRS No. 15.
- **Alternative No. 4** - Threat to residential human life and safety from a dam failure would be eliminated for the relocated families. Flood protection would continue for motorists downstream of FRS No. 15. However, threat of dam failure would remain.

## **FLOOD DAMAGES**

- **Present Conditions** – The current dam provides complete protection from the 25-year, 24-hour event storm.
- **Alternative No. 1** - Downstream flooding and damages to property and infrastructure would increase. The TXDoT and Bell County would incur additional costs from repairing increased flood damages to bridge and roadway. The limits of the 100-year floodplain would increase, which would affect potential future development.
- **Alternative No. 2** - Same as Alternative No. 1
- **Alternative No. 3** - There would be continued protection from flooding. Threat of a catastrophic breach would be reduced due to FRS No. 15's ability to sustain the PMP without overtopping the dam. Although the level of protection is greater than Alternative No. 4, the difference in damage reduction benefits is insignificant.
- **Alternative No. 4** - Flood damages would be eliminated for relocated properties. Flood damage protection maintained for FM 93. However, threat of dam failure would remain.

## **THREATENED AND ENDANGERED (T&E) SPECIES**

- **Present Conditions** - Current habitat is composed of an approximately 15-acre open water sediment pool and low quality rangeland with invading brush species. There are no species federally or state listed as threatened or endangered or suitable habitat for listed species in or close to the proposed project site.
- **Alternative No. 1** - No Effect.
- **Alternative No. 2** - No Effect.
- **Alternative No. 3** - No Effect.
- **Alternative No. 4** - No Effect.

## **CULTURAL AND HISTORIC RESOURCES**

- **Present Conditions** – No known cultural resources will be affected.
- **Alternative 1** - There would be potential to affect cultural resources (should any be present) in areas where earth fill from dam is placed and in areas of any necessary modifications to infrastructure downstream.
- **Alternative 2** - There would be potential to affect cultural resources (should any be present) in previously undisturbed areas where earth fill from dam is placed and in areas of any necessary modifications to infrastructure downstream.
- **Alternative 3** - NRCS has conducted a cultural resources survey of the proposed rehabilitation work areas and no known cultural resources will be affected by this alternative. In the event of a discovery of a potentially eligible cultural resource during construction, all work will cease until a cultural resource specialist evaluates the site and recommends a course of action to be followed.
- **Alternative 4** - There would be potential to affect cultural resources (should any be present) in areas where structures would be removed from the breach area and in areas of any necessary modifications to infrastructure downstream.

## PRIME FARMLANDS

- **Present Conditions** – There is prime farmland located downstream in the project area but there will be no effect under present conditions. The Farmland Protection Policy Act (FPPA) 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”.
- **Alternative 1** – No effect.
- **Alternative 2** – No effect.
- **Alternative 3** – A total of 4 acres in the proposed work area are in soils classified as Important Farmland and are subject to the FPPA. A composite rating for the soils in the proposed project impact area scored a total of 77 points in Part VII of the form AD-1006. The FPPA law states that sites that score less than 160 will need no further consideration; therefore the 4 acres affected is considered minimal.
- **Alternative No. 4** – Same as Present Conditions.

## WETLANDS

- **Present Conditions** - The sediment pool for FRS 15 is composed of a 15-acre palustrine (Cowardin Classification) wetland system with deep water and shallow water habitats. Stream channels above FRS 15 are ephemeral, and a 1.7-acre agricultural pond is located downstream of the structure. There are no areas that meet the definition of a wetland under the Clean Water Act in the project area.
- **Alternative No. 1** - This alternative would convert the 15-acre sediment pool to an ephemeral stream with limited riparian zone and upland grassland. The upland grassland would most likely be maintained as grazing for cattle or, if abandoned, convert to a juniper stand due to the heavily established juniper presently in the project site. Without FRS 15 in place, the increased flows due to development upstream would cause the ephemeral stream to incise, and the increased sediment loads would increase aggradation downstream. Additionally, the increased flows would adversely impact the 1.7-acre downstream agricultural pond both by sedimentation and probably breaching the dam by over topping during a one to five year storm event.
- **Alternative No. 2** - This alternative would convert the 15-acre sediment pool to an ephemeral stream with adjacent riparian zone and upland grassland. Reshaping the ephemeral channel and establishing riparian vegetation would help stabilize banks and reduce erosion. The installation of a GSS would reduce incising, prevent head cuts from moving upstream, and reduce aggradation downstream. The upland grassland, without constant maintenance, would most likely convert to a juniper stand. The increased flows would adversely impact the 1.7-acre downstream agricultural pond probably breaching the dam by over topping during a one to five year storm event.
- **Alternative No. 3** - The 15-acre sediment pool would be temporarily impacted due to construction activities. The pool would be lowered to install the new principal spillway and raise the height of the dam. Downstream turbidity might be temporarily increased during the construction period. The sediment pool would be returned to preconstruction size and elevation after construction is completed. The downstream agricultural pond is currently experiencing erosion and over topping during the one to five year storm events, and the installation of an additional principal spillway would have only minor increased adverse impacts to the pond.
- **Alternative No. 4** – There would be no impact to the sediment pool or the downstream agricultural pond.

## AIR QUALITY

- **Present Conditions** - No air quality problems have been specifically identified.
- **Alternative No. 1** - Impacts will be of a temporary nature associated with earthmoving and other construction activities. These conditions will only be present during construction activities and until the disturbed areas are re-vegetated.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - Same as Alternative No. 1.
- **Alternative No. 4** - Same as Alternative No. 1 except to a lesser degree.

## WATER QUALITY

- **Present Conditions** - No water quality problems have been specifically identified. Data on the quality of runoff in the sediment pool is limited. There is a potential of pollutants from the upstream urbanized area being carried in the runoff. Also, organic material and sediment deposited in the sediment pool affects the quality of the water.
- **Alternative No. 1** - Impacts will be of a temporary nature associated with earthmoving and other construction activities. Sediment in stream flow will be carried downstream. Increased flows due to the removal of FRS 15 would increase erosion and cause the stream to incise. Sediments and pollutants that are currently captured in the sediment pool would move downstream, increasing sediment loads and increasing aggradation downstream.
- **Alternative No. 2** - Same as Alternative No. 1 except to a lesser degree since re-vegetation and grade control measures are planned in the present sediment pool area.
- **Alternative No. 3** - Impacts will be of a temporary nature associated with earthmoving and other construction activities. These conditions will only be present during construction activities and until the disturbed areas are re-vegetated. The Storm Water Pollution Prevention Plan (SWPPP) required under the Texas Pollutant Discharge Elimination System (TPDES) and the Texas Commission on Environmental Quality (TCEQ) Storm Water Construction General Permit would minimize any degradation of water quality during construction.
- **Alternative No. 4** - Same as Alternative No. 3 except to a lesser degree.

## WATER QUANTITY

- **Present Conditions** – The un-named tributary on which FRS No. 15 is constructed is an ephemeral stream. The amount of water contained in the sediment pool area of FRS No. 15 is dependent on rainfall and runoff.
- **Alternative No. 1** – During storm events, flood flows would move downstream adding to volume and peaks as it moves, thus increasing the floodplain to conditions existing prior to construction of the dam.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - During construction the sediment pool would be ineffective for a period of 2 to 3 months while the additional principal spillway outlet pipe is being installed. This condition will only be present until the lowest gated port in the existing principal spillway is closed following construction.
- **Alternative No. 4** – Same as present conditions except for reduction in sediment pool volume with time.

## AESTHETICS

- **Present Conditions** – FRS No. 15’s sediment pool consists of a 15 acre water body that provides livestock water and recreational activities for adjacent landowners. There is currently limited development adjacent to the sediment pool. Accessibility to and visibility of the sediment pool is limited to adjacent landowners due to surrounding topography and dense cedar brush.
- **Alternative No. 1** – This alternative would leave a significant portion of the embankment in place. The material (about 35,000 cu yd) will be placed in the present easement area. The remaining portion of the embankment and the land currently covered by the sediment pool would be maintained as a greenbelt area.
- **Alternative No. 2** - This alternative would leave a significant portion of the embankment in place. Excavated material (about 35,000 cu yd) would be placed in the sediment and detention pool areas and all exposed areas would be vegetated as needed for erosion control (about 10 acres). The remaining portion of the embankment and land currently covered by the sediment pool would be maintained as a greenbelt area. Riparian vegetation would be established along the stream channel (about 3 acres). Channel work would be installed to reconnect the stream channel through the sediment pool.
- **Alternative No. 3** - About 8 acres would be affected by construction activities and 4 of these acres would require reseeding to native or introduced species following construction.
- **Alternative No. 4** - Same as Present Condition except the area acquired downstream (residential acreage) would be maintained as a greenbelt area.

## SEDIMENTATION

- **Present Conditions** – Sedimentation of the reservoir was surveyed and more than 130 acre-feet of capacity remains. The sediment contained in the sediment and detention areas of the structure has not been tested.
- **Alternative No. 1** - Current sediment deposits would be dislodged and transported downstream by the erosion process (headcutting created by breaching of FRS No. 15) until natural re-vegetation occurs. This process would continue until the incised ephemeral stream channel through the sediment deposit becomes stable.
- **Alternative No. 2** – Current sediment would be stabilized with a GSS; however major flows would cause some sediment to be transported downstream.
- **Alternative No. 3** – Sediment volume of the structure will be provided for the next 100 plus years. Testing of the sediment will not be needed as it will not be disturbed during construction activities.
- **Alternative No. 4** - Same as Alternative 3.

## LAND VALUES

- **Present Conditions** – Land below the dam to the north of FM 93 is in Temple ETJ. The property to the south of FM 93 that includes FRS No. 15 and the drainage area for FRS No. 15 is located in Belton ETJ and is being studied for annexation into the Belton City Limits.
- **Alternative No. 1** – According to local development projections, there is anticipated future growth along FM 93 within the next 10 years. Although property on the east side of the sediment pool is currently agricultural use (grazing land), this land could be developed, although the number of residential lots would be limited. Thus, the value of land formerly adjacent to the sediment pool would be impacted negatively. There is also a potential for future growth downstream of FRS No. 15, specifically on the west side of

the tributary between the dam and south of FM 93 (where several houses are already located), and primarily on the east side of the tributary north of FM 93 adjacent to the farm pond. As is the case upstream of the dam, suitable residential sites downstream would be limited. Accounting for these projections, future development downstream would be altered to insure no development takes place within the enlarged 100-year floodplain. About 8 acres would be added to the modified 100-year floodplain. Since no inhabitable development could take place within the 100-year floodplain, the fair market value for this acreage would also be affected negatively.

- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - Based on projections outlined in Alternative No. 1, downstream and upstream property values suitable for development will be maintained.
- **Alternative No. 4** - Upstream property values would be maintained. Four downstream properties at-risk from a catastrophic breach of FRS No. 15 would be relocated to other areas in the county. In order to ensure that future development does not occur within the breach zone, this alternative also consists of purchasing deed restrictions on remaining land within the breach zone.

### **FISH AND WILDLIFE HABITAT**

- **Present Conditions** – FRS No. 15 provides approximately 15 acres of deep water and shallow water habitat. Although there is currently limited development adjacent to the sediment pool, the majority of land use adjacent to the structure is private undeveloped lands used primarily for livestock grazing. The land cover is predominantly poor condition rangeland with a predominance of vegetation that is limited to low quality annual and perennial cool and warm season grasses, forbs, and invading brush species. FRS No. 15 currently provides habitat for small mammals, neo-tropical songbirds, shore birds, various water fowl, and a variety of fish species. Various species of reptiles and amphibians also inhabit the project site.
- **Alternative No. 1** - This alternative would convert 15 acres of deep and shallow water habitat to an ephemeral stream with associated upland habitat. In addition, this alternative would most likely cause the breach of the 1.7-acre downstream agricultural pond, converting that 1.7 acres of aquatic habitat to an ephemeral stream and associated riparian areas. Breaching FRS 15 would adversely impact all aquatic and amphibious species presently using the sediment pool, small mammals and reptiles that use open water, and all aquatic avian species. Aggradation would adversely impact fisheries downstream, and increased flows would adversely impact downstream riparian zones through erosion and lateral movement of the stream channel. The increase in open grassland would benefit seed eating species, small mammals such as rats and mice, and reptile species such as snakes and lizards. The open grassland would produce larger insect populations and therefore benefit insect eating species such as bobwhite quail, raccoons, and possum. The increase in open areas with prey species would benefit predator species such as raptors, coyote, and bobcat.
- **Alternative No. 2** - This alternative would have the same ultimate impacts as alternative 1, but with stream channel shaping and planting of riparian vegetation, the habitats would function in less time and would be more stable than Alternative 1.
- **Alternative No. 3** - This alternative would have only minor temporary adverse impact to current fish and wildlife habitat. The sediment pool would be lowered a minimum of 10 feet below the principal spillway (610 MSL) with a possibility of lowering the pool to the gated port at the bottom of the principal spillway (approximately 601 MSL) during construction activities. Lack of dissolved oxygen and increase in water temperature could adversely affect fish populations during this period. Temporary turbidity due to the

construction activities could impact fish and waterfowl habitat in the sediment pool and the downstream agricultural pond during the construction period. After construction, the sediment pool would be unchanged from its present condition, but downstream flows during storm events would be increased with possible minor impacts to the channel below the dam and the downstream pond.

- **Alternative No. 4** – About 15 acres of open water (palustrine – Cowardin Classification) habitat and associated shoreline areas would be maintained. Acquired downstream properties would be converted into a greenbelt area, enhancing fish and wildlife habitat and natural resources.

## RECREATION

- **Present Conditions** – Access to the sediment pool and the farm pond located downstream for recreational purposes is available only to adjacent landowners. A conservative estimate for recreational activities is about 100 visitor days per year.
- **Alternative No. 1** - Recreational opportunities for FRS No. 15 and the farm pond would be lost.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** – Recreational opportunities for FRS No. 15 and the farm pond would continue. Frequency and depth of flooding will remain unchanged in the area upstream of FRS No. 15. Because of the faster draw-down time due to the additional principal spillway, debris clean-up after major storm events could be done sooner, thus allowing recreational opportunities to commence sooner, also.
- **Alternative No. 4** – Same as Present Conditions.

## CUMULATIVE IMPACTS

The combined, incremental effects of human activity, referred to as cumulative impacts, are in some cases a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources and can result in the degradation of important resources. The assessment of cumulative impacts in National Environmental Policy Act (NEPA) documents is required by the Council of Environmental Quality (CEQ) regulations (1987). Cumulative impacts result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that is the focus of this cumulative impact analysis. Cumulative impacts for the proposed plan have been identified through discussions with resource agencies and interest groups.

Outside actions in addition to those evaluated here are not known. Additional improvements to the dam, sediment pool, and auxiliary spillway are not planned at this time. The potential for upstream development may affect hydrology or hydraulics, but the type and extent are not known. Although the project area is within the ETJ areas of the Cities of Belton and Temple, it is not anticipated that Alternative No. 3 would adversely affect future development. To the contrary, it is projected that the rehabilitation of FRS No. 15 would allow any conceived future development (upstream and/or downstream) to be unimpeded. Downstream/upstream land uses are anticipated to remain the same in the short term (10 years), but are projected to change in the long term. According to TXDOT, there are no plans to modify FM 93 in the next 10 years. As such, cumulative effects as a result of the Rehabilitation Alternative No.3 are not anticipated.

## **CONTROVERSY**

There are no known areas of controversy.

## **RISK & UNCERTAINTY**

The areas of risk and uncertainty associated with this project lie in the accuracy of estimating flood flows, flood elevations, cost estimates associated with each alternative, property values, the reliability of future projections, and the assessment of impacts on damages. The uncertainty of flood flows and water surface elevations has the potential for increased damages as new properties are converted from agricultural to residential and commercial use. It is possible these uncertainties could lead to increased risk to human life in the event of a dam breach. Hydrologic methods and computer modeling used in this analysis are consistent with the standards of practice at this time. However, the tributary is not gauged and no verification of storm flows is possible. Cost estimates were developed from available historic data. Factors discovered during actual design, notably the bearing capacity of the existing structure and availability of suitable material for construction could affect these estimates. The potential impacts for each alternative are estimated using techniques that relate potential damage to lost opportunity. However, these methods are in part based on professional judgment and actual experience could be different.

The Sponsors currently own easements that meet minimum Public Law 83-566 requirements. However, these easements are at an elevation below top of dam. Although any future upstream development must adhere to current easement restrictions, there is the possibility of development below top of dam elevation. Such development could be at risk from flooding during events which exceed the elevation of upstream easements.

Within the context of this study effort, all alternatives were considered on a comparable basis. There does not appear to be any area that by using different procedures or making more intensive studies would have resulted in a different decision.

## **CONSULTATION & PUBLIC PARTICIPATION**

### **PROJECT SPONSORS:**

Sponsors of the original Nolan Creek Watershed project and of the FRS No. 15 rehabilitation project are Bell County WCID No. 6 and the Central Texas SWCD. Bell County WCID No. 6 agreed to be the lead sponsor and to provide coordination of the project.

### **PLANNING TEAM:**

An Interdisciplinary Planning Team provided for the “technical” administration of this project. Technical administration includes tasks pursuant to the NRCS nine-step planning process, and planning procedures outlined in the NRCS-National Planning Procedures Handbook. Some of the tasks undertaken by the Interdisciplinary Planning Team include but are not limited to: Preliminary Investigations, Hydrologic and Engineering Analysis, Reservoir Sedimentation Surveys, Economic Analysis, Formulating and Evaluating Alternatives, and Writing the Supplemental Plan/EA. Informal discussions amongst the planning team, sponsors, NRCS, and landowners were conducted throughout the planning period.

A review of (NEPA) concerns was initiated by the planning team. Identified NEPA concerns were reviewed and documented.

An NRCS Archaeologist performed a cultural resources survey of the proposed project site. After consultation of the prepared report with the State Historic Preservation Officer, it was determined that no historic properties would be affected.

### **PUBLIC PARTICIPATION:**

A public meeting was held on September 25, 2006, to explain the Watershed Rehabilitation Program and to scope resource problems, issues, and concerns of local residents associated with the FRS No. 15 project area. Invitations to participate in the public meeting were made by personal telephone calls and were e-mailed to potentially affected landowners and interested parties around FRS No. 15 and reservoir area.

Potential alternative solutions to bring the Nolan Creek Watershed FRS No. 15 into compliance with current dam safety criteria were presented at the initial meeting. Through verbal and written comments, meeting participants provided input on issues and concerns to be considered in the planning process.

A second meeting with landowners and project sponsors was held in January, 2007, to review first draft, summarize planning accomplishments, convey results of the reservoir sedimentation survey, and present various structural and non-structural alternatives.

**Comments on the Draft Supplemental Watershed Plan/Environmental Assessment were requested from the following federal, state, and local agencies and organizations. Response letters and disposition of comments are located in Appendix B.**

Governor - State of Texas  
Texas Office of State-Federal Relations (State Single Point of Contact)  
Texas State Soil and Water Conservation Board  
Texas Department of Transportation  
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 District  
USDI-Bureau of Reclamation  
U.S. Environmental Protection Agency  
U.S. Fish and Wildlife Service  
USDA-Forest Service  
USDA-Farm Service Agency  
City of Belton  
Bell County Commissioners Court  
Central Texas Soil and Water Conservation District  
Local Steering Committee members  
Bell County WCID No. 6

## **PROVISIONS OF THE PREFERRED ALTERNATIVE**

### **PREFERRED ALTERNATIVE**

Alternative No. 3 is the preferred alternative. The dam will be modified to meet current performance and safety standards for a high hazard dam and the service life of FRS No. 15 will be extended for an additional 100 years. The modification will consist of rehabilitation of FRS No. 15 by raising the top of dam 2.7 feet with earth fill to elevation 641.1 and leaving the existing 2-foot by 6-foot by 19-foot drop inlet type principal spillway and connecting 18-inch pipe intact. A new 30-inch hooded inlet type principal spillway will be added at elevation 620.2 (elevation of existing principal spillway crest). Both principal spillways will outlet into the same natural rock plunge pool. The existing auxiliary spillway will be widened by 20 feet, the entrance section will be modified, the bottom width will be vegetated, and the entire auxiliary spillway will be fenced for livestock exclusion. Estimated cost is \$1,043,600.

Construction activities will result in the disturbance of approximately 8 acres. The removal of vegetation will only be that necessary to allow rehabilitation of the structure. Disturbed areas will be reestablished to vegetation to reduce erosion that could occur due to soil disturbance.

The sponsors will develop an Emergency Action Plan (EAP) before any rehabilitation construction activities begin stating the responsibilities for the development, implementation and review of actions necessary to provide safety to individuals downstream of the structure should extreme flooding occur.

### **RATIONALE FOR ALTERNATIVE PREFERENCE**

Alternative plans were formulated as required by NRCS policy and “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies” (P&G) (USWRC, 1985). 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 (NED) Plan. Alternative No. 3 (Rehabilitation of FRS No. 15) is the NED plan.

Alternative plans were formulated in consideration of the purposes of the project and concerns expressed during the public scoping process. Formulation of the alternative plans gave consideration to four criteria: completeness, effectiveness, efficiency, and acceptability. Alternative Nos. 1, 2, 3, and 4 all meet the criteria for completeness. Alternative Nos. 1 and 2 remove the safety hazard of the dam from failing but they do not address the primary problem of assuring that downstream flood protection will continue to be provided. Alternative No. 4 was rejected because it would involve the relocation of four families out of the floodplain (possibly by the use of eminent domain by the Bell County WCID No. 6), and the purchase of deed restrictions on remaining land within the breach zone.

Alternative No. 3 is the preferred alternative. It meets the purpose and need to maintain the present level of flood control benefits and comply with current performance and safety standards. It also produces the highest net monetary benefits and a local sponsor has agreed to fund the local share of the cost.

## PURPOSE

The purposes of the FRS No. 15 rehabilitation project are to maintain the present level of flood control benefits and comply with the current performance and safety standards.

## MEASURES TO BE INSTALLED

The recommended plan consists of structural modifications to FRS No. 15 as follows:

- Raise top of dam elevation 2.7 feet from 638.4 feet to 641.1 by using earth fill.
- Install a new 30 inch hooded inlet type principal spillway at elevation 620.2.
- Widen the existing auxiliary spillway by 20 feet and make minor modifications in the entrance section.

## COMPARISON OF STRUCTURAL DATA

Table G shows comparison of structural data between original as-built and planned rehabilitation:

<i>Table G Comparison of Structural Data</i>				
<b>FRS No. 15</b>	<b>Unit</b>	<b>As Built<sup>1/</sup></b>	<b>Existing Conditions<sup>2/</sup></b>	<b>Planned</b>
Surface Area (Principal Spillway Crest)	acres	15	15	15
Elevation, Top of Dam (effective)	Ft. MSL	638.4	638.4	641.1
Principal Spillway	type	Standard drop inlet	Standard drop inlet	Standard drop inlet plus hooded inlet
Length of Dam	Ft.	2,024	2,024	2,104
Elevation, Principal Spillway Crest	Ft.MSL	620.2	620.2	620.2
Pipe Diameter, Principal Spillway	in	18	18	18 plus 30
Auxiliary Spillway	type	Veg.	Veg.	Veg.
Elevation, Auxiliary Spillway	NAD27, ft MSL	633.9	633.4	633.7
Bottom Width, Auxiliary Spillway	Ft.	100	100	120
Submerged Sediment Storage	acre-feet	146	132.8	132.8 <sup>3/</sup>
Aerated Sediment Storage	acre-feet	11	8.3	3.6 <sup>4/</sup>
Flood Storage	acre-feet	366	363.3	363.3
Total Storage at Auxiliary Spillway Crest	acre-feet	523	496.1	500.3

<sup>1/</sup> As built data based on 1972 Record Drawings

<sup>2/</sup> Existing conditions data based on 2005 survey data.

<sup>3/</sup> 44.8 ac-ft needed for 100 yr. program life, 132.8 ac-ft available at elevation 620.2(lowest ungated outlet)

<sup>4/</sup> Needed for 100 year program life

## PERMITS, COMPLIANCE AND REQUIREMENTS PRIOR TO CONSTRUCTION

### Potential Permits Needed

Any discharge of dredged or fill material in a water of the US associated with rehabilitation of FRS No. 15 would require a Department of the Army permit under Section 404 of the Clean Water Act of 1972. It is likely that any such discharge would be authorized by a general permit such as Nationwide General Permit 3 for Maintenance without a Preconstruction Notification.

For projects with disturbances equal to or greater than five acres it is necessary to have a Storm Water Pollution Prevention Plan (SWPPP) in place at least 48 hours prior to and during construction of the proposed project and filing a Notice of Intent with the TCEQ is required. A

Notice of Termination (NOT) must be filed once the site has reached final stabilization. A copy of the Notice of Intent must be submitted by the construction site operator to the operator (City, County, etc.) of the storm sewer system that receives storm water runoff from the construction site.

### **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 SWPPP. U.S. Army Corps of Engineers guidelines indicate that the project will require authorization under Section 404 of the Clean Water Act, and that the project will likely fall within the scope of an existing nationwide permit (NWP#3, Maintenance). Any applicable permits required by the U.S. Army Corps of Engineers will be obtained before any construction activities begin.

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 3 and no known sites are recorded in the vicinity. Ensuing disturbances associated with rehabilitation measures will be monitored for the presence of undiscovered sites by NRCS personnel trained in recognition of cultural resources. 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 among 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 project will be operated and maintained by the sponsors. Bell County WCID No. 6 has the primary responsibilities for maintenance of FRS No. 15. A new Operation and Maintenance (O&M) Agreement will be developed with Bell County WCID No. 6 and the Central Texas SWCD for FRS No. 15 for the 100-year program life of the structure. The new O&M Agreement will be signed before the Project Agreement is signed. O&M activities include but are not limited to inspections, maintenance and repairs of the principal spillways, dam, vegetation and the auxiliary spillway. Based on data from Bell County WCID No. 6, it is estimated that O&M activities will cost about \$2,000 per year.

### **Memorandum of Understanding**

The sponsors and NRCS will enter into a Memorandum of Understanding (MOU) to establish a framework under which the sponsors may proceed with work on specific aspects of the proposed rehabilitation project. Accordingly, that specified work might then contribute towards the sponsors 35 percent cost-share obligation.

### **Project Agreement**

The Sponsors responsible for the 35 percent non-federal cost share (Bell County WCID No. 6) and the NRCS will enter into a Project Agreement in accordance with the National Contract Grants and Agreement Manual before any work is initiated by either the sponsor or the NRCS.

## Emergency Action Plan

The sponsors will provide leadership in developing an Emergency Action Plan (EAP) prior to the commencement of construction and will review and update the EAP annually with local emergency response officials. NRCS will provide technical assistance in preparation and updating of the EAP. The breach inundation map and data will be the basis for potential areas to be affected and citizens to be notified. The purpose of the EAP is to identify areas at risk, outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of FRS No. 15.

## COST, INSTALLATION AND FINANCING

The installation of the project will be financed jointly by Bell County WCID No. 6 and the NRCS. NRCS will use funds appropriated for this purpose. The percentages of the eligible project costs including construction, engineering, project administration, and land rights to be paid by Bell County WCID No. 6 and the NRCS are as follows:

	<u>Bell County WCID No. 6</u>	<u>NRCS</u>	<u>Estimated Project Cost</u>
Rehabilitation of FRS No.15	35 %	65 %	\$816,900

An amount up to the percentage rate specified may be satisfied by Bell County WCID No. 6 for cost of an element such as engineering, real property acquisition 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 costs will not exceed 100 percent of the construction cost.

NRCS is responsible for the engineering services and project administration costs (\$226,700) it incurs. However, these costs are not used in the calculation of the federal cost share. These costs are, however, included in the Estimated Installation Cost (Table 1, Appendix A). Also, costs of water, mineral and other resource rights, as well as federal, state and local permits are the responsibility of Bell County WCID No. 6 and are not counted toward local cost share. See Table 2 in Appendix A for a complete distribution of total rehabilitation costs.

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## LIST OF PREPARERS

Name & Present Title	Education	Experience (Years)
Glen Grandy, President, Bell County Water Control and Improvement District No. 6		
Vincent R. Sisneros, District Conservationist, NRCS	B.S. Recreation	28
Steve Uselton, Soil Conservationist, NRCS	B.S. Agriculture Education	29
James Featherston, Agricultural Economist, NRCS	M.S. Agricultural Economics	30
David Petefish, Geologist, NRCS	M.S. Geology	35
Calvin Sanders, Cultural Resources Specialist, NRCS	M.A. Anthropology	24
Ronnie Skala, P. E. Hydraulic Engineer, NRCS	B.S. Agricultural Engineering	28
Russell Castro, Wildlife Biologist, NRCS	B.S. Wildlife Management	25
David Strakos, Civil Engineering Technician – NRCS	High School Diploma	29
Jim Kelly, Wildlife Biologist, NRCS	M.S. Forestry	6

The local steering committee provided invaluable information, local concerns, and reviews during the development of the environmental assessment.

## STEERING COMMITTEE MEMBERS

NAME	ORGANIZATION	PHONE	EMAIL
Glen Grandy*	Bell County WCID No. 6	254-290-0222	
W. R. McGuire	Landowner	254-913-6045	rmcguire@vvm.com
Pat Moore	Landowner	254-939-3575	
Bill Willess	Landowner	254-721-3037	
Jeff Bodkin	Landowner	254-939-1113	Jeffrey-bodkin@amedel.army.mil
Clark Moore	Landowner	254-939-2697	
Robin Bodkin	Landowner	254-939-1113	bodkin@clearwire.net
Stanley Glaser	Central Texas SWCD	254-593-2473	
Frank Pate	Bell County WCID No. 6	254-698-6329	
W. E. Randolph	Bell County WCID No. 6	254-939-0912	

\* Chairperson

## **APPENDICES**

- APPENDIX A      Table 1 - Estimated Installation Cost
- Table 2 - Estimated Cost Distribution, Structural and Non- Structural Measures
- Table 3 - Structural Data – Dams with Planned Storage Capacity
- Table 4 - Estimated Average Annual NED Costs
- Table 5 - Estimated Average Annual Flood Damage Reduction Benefits
- Table 6 - Comparison of NED Benefits and Costs
- 
- APPENDIX B:      Letters and Oral Comments Received on Draft Supplemental Watershed Plan and Environmental Assessment
- Discussion and Disposition of Comments on the Draft Supplemental Watershed Plan and Environmental Assessment
- 
- APPENDIX C:      Support Maps and Site Photos
- 
- APPENDIX D:      Investigation and Analysis
- 
- APPENDIX E:      Consultation and Public Scoping Process
- 
- APPENDIX F:      Watershed Project Map

## **APPENDIX A**

### Tables 1-6

Table 1 - Estimated Installation Cost

Table 2 - Estimated Cost Distribution, Structural and Non-Structural Measures

Table 3 - Structural Data – Dams with Planned Storage Capacity

Table 4 - Estimated Average Annual NED Costs

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits

Table 6 - Comparison of NED Benefits and Costs

**APPENDIX A**

**Table 1 - Estimated Installation Cost**  
**FRS No. 15**  
Nolan Creek Watershed, Texas  
(Dollars) <sup>1/</sup>

<b>Installation Cost Item</b>	<b>Unit</b>	<b>Number</b>	<b>Estimated Costs</b> <sup>2/</sup>		
			<b>Public Law 83-566 Funds</b>	<b>Other Funds</b>	<b>Total</b>
Rehabilitation of FRS No. 15	No.	1	\$757,700	\$285,900	\$1,043,600
<b>Total Project</b>			<b>\$757,700</b>	<b>\$285,900</b>	<b>\$1,043,600</b>

Mar/2007

<sup>1/</sup> 2006 Prices.

<sup>2/</sup> Public Law 83-566 Funds include NRCS Engineering and Project Administration (\$226,700), which are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Total Eligible Project Cost of \$816,900.

**APPENDIX A**

**Table 2 - Estimated Cost Distribution - Structural and Non-structural Measures  
FRS No. 15  
Nolan Creek Watershed, Texas  
(Dollars) <sup>1/</sup>**

	Installation Cost – Public Law 83-566 <sup>2/</sup>				Installation Cost – Other Funds					
	Construction	Engineering	Project Administration	Total PL 566	Construction	Engineering	Real Property Rights	Project Administration	Total Other	Total Installation Cost
Rehabilitation of FRS No. 15	\$531,000	\$109,700	\$117,000	\$757,700	\$200,500	\$0	\$52,500	\$32,900	\$285,900	\$1,043,600
<b>GRAND TOTAL</b>	<b>\$531,000</b>	<b>\$109,700</b>	<b>\$117,000</b>	<b>\$757,700</b>	<b>\$200,500</b>	<b>\$0</b>	<b>\$52,500</b>	<b>\$32,900</b>	<b>\$285,900</b>	<b>\$1,043,600</b>

Mar/2007

<sup>1/</sup> 2006 Prices.

<sup>2/</sup> Federal Engineering and Project Administration costs (\$226,700) are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Total Eligible Project Cost of \$816,900.

**APPENDIX A**  
**Table 3 - Structural Data – Dams with Planned Storage Capacity**  
**FRS No. 15**  
Nolan Creek Watershed, Texas

Item	Unit	FRS No.15
Class of structure		High
Seismic zone		0
Location	dec. deg.	Lat. 31.07, Long. -97.51
Uncontrolled drainage area	sq-mi	1.36
Runoff curve number (1-day) (Avg. AMC)		78
Time of concentration ( $T_c$ )	Hrs	1.24
Elevation top of dam <sup>2/</sup>	ft	641.1
Elevation crest of auxiliary spillway <sup>2/</sup>	ft	633.7
Elevation crest principal spillway <sup>2/</sup>	ft	620.2
Elevation sediment pool <sup>2/</sup>	ft	620.2
Maximum height of dam	ft	49.6
Volume of fill	yd <sup>3</sup>	126,540 <sup>1/</sup>
Total capacity (auxiliary spillway crest)	ac-ft	500.3
Sediment pool	ac-ft	132.8 <sup>3/</sup>
Aerated sediment	ac-ft	3.0
Floodwater retarding pool	ac-ft	364.5
Surface area		
Sediment pool	acres	15
Floodwater retarding pool	acres	40.3
Principal spillway		
Rainfall volume (1-day)	in	9.8
Rainfall volume (10-day)	in	16.2
Runoff volume (10-day)	in	10.63
Type - existing (standard drop inlet)		concrete
Diameter existing	in	18
Capacity existing	ft <sup>3</sup> /s	40
Type - secondary (hooded inlet)		concrete
Diameter hooded	in	30
Capacity hooded	ft <sup>3</sup> /s	139
Auxiliary spillway		
Vegetated		
Bottom width	ft	120
Exit slope	%	4
Frequency of operation	% chance	1.0
Auxiliary spillway hydrograph		
Rainfall volume	in	13.3
Runoff volume	in	10.43
Storm duration	hrs	6
Velocity of flow ( $V_c$ )	ft/s	8.6
Maximum reservoir water surface elevation	ft	636.18
Freeboard hydrograph <sup>4/</sup>		
Rainfall volume	in	30.6
Runoff volume	in	27.46
Storm duration	hrs	6
Maximum reservoir water surface elevation	ft	641.1
Storage capacity equivalents		
Sediment volume	in	1.83
Floodwater retarding volume	in	5.02

<sup>1/</sup> Original volume of fill in dam 108,740 yd<sup>3</sup>, volume of fill in the dam used in rehabilitation project 17,800 yd<sup>3</sup> Mar/2007

<sup>2/</sup> Benchmark error between as-built plans elevations and surveyed elevations. New TBM brought in and re-established by NRCS construction survey crew 1/3/06. Comparison table is provided below.

<sup>3/</sup> Does not include 15.9 ac. ft. of sediment accumulated in reservoir.

<sup>4/</sup> The 6-hour storm was the most conservative design for the FBH.

**TABLE 3 (cont.) – FOOTNOTES**

FRS No.	Principal Spillway Crest				Auxiliary Spillway Crest				Effective Top of Dam			
	Plans	Survey	Δ	Rehab	Plans	Survey	Δ	Rehab	Plans	Survey	Δ	Rehab
15	810.0	620.2	189.8	620.2	823.7	633.4	190.3	633.7	828.2	638.4	189.8	641.1

**APPENDIX A**  
**Table 4 - Estimated Average Annual NED Costs**  
**FRS No. 15**  
Nolan Creek Watershed, Texas  
(Dollars) <sup>1/</sup>

Evaluation Unit	----- Project Outlays -----		Total
	Amortization of Installation Cost <sup>2/</sup>	Operation, Maintenance and Replacement Cost	
FRS No.15	\$51,300	\$2,000	\$53,300
<b>Grand Total</b>	<b>\$51,300</b>	<b>\$2,000</b>	<b>\$53,300</b>

Mar/2007

<sup>1/</sup> Price base 2006

<sup>2/</sup> Amortized for 100 years at 4.875 percent

**APPENDIX A**

**Table 5 - Estimated Average Annual Flood Damage Reduction Benefits**

**FRS No. 15**

Nolan Creek Watershed, Texas

(Dollars) <sup>1/</sup>

<b>Item</b>	<b>Estimated Average Annual Damages Without the Project <sup>2/</sup></b>	<b>Estimated Average Annual Damages With the Project <sup>2/</sup></b>	<b>Estimated Average Annual Benefits</b>
Floodwater			
Crop and Pasture	\$20,800	\$20,600	\$200
Other Agricultural	\$56,800	\$56,100	\$700
Nonagricultural (Road and Bridge)	\$103,100	\$70,200	\$32,900
Nonagricultural (Urban)	\$534,400	\$518,900	\$15,500
Subtotal	\$715,100	\$665,800	\$49,300
Sediment			
Overbank Deposition	\$1,200	\$1,100	\$100
Erosion			
Flood Plain Scour	\$4,700	\$4,600	\$100
<b>Grand Total</b>	<b>\$721,000</b>	<b>\$671,500</b>	<b>\$49,500</b>

Mar/2007

<sup>1/</sup> Price Base: 2006 prices.

<sup>2/</sup> Original downstream damages updated using applicable indices and updated data.

**APPENDIX A**  
**Table 6 - Comparison of NED Benefits and Costs**  
**FRS No. 15**  
Nolan Creek Watershed, Texas  
(Dollars) <sup>1/</sup>

Item	Average Annual Benefits					Average Annual Cost <sup>3/</sup>	Benefit/Cost Ratio
	Damage Reduction <sup>2/</sup>	Maintain Property Values	Maintain Incidental Recreation Benefits	Avoidance of Consequences of Sponsor's Breach	Total		
Rehabilitation of Floodwater Retarding Structure No. 15	\$49,500	\$6,900	\$3,300	\$15,000	\$74,700	\$53,300	1.4:1.0

Mar/2007

<sup>1/</sup> Price Base: 2006 prices

<sup>2/</sup> From Table 5

<sup>3/</sup> From Table 4

## **APPENDIX B**

### **Letters and Oral Comments Received on Draft Supplemental Watershed Plan and Environmental Assessment**



# TEXAS STATE SOIL & WATER CONSERVATION BOARD

## STATE HEADQUARTERS

311 North 5th Street • P.O. Box 658 • Temple, Texas 76503-0658  
Phone: 254-773-2250 • Fax: 254-773-3311 • www.tsswcb.state.tx.us

---

12 April 07

Walter Douglas, State Conservationist, Acting  
USDA Natural Resources Conservation Service  
101 South Main  
Temple, Texas 76501-7602

**Re: FRS 15 Nolan Creek Watershed**

Dear Mr. Douglas:

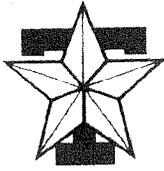
We have reviewed the *Draft Supplemental Plan No. III and Environmental Assessment* for the proposed rehabilitation of Floodwater Retarding Structure No. 15 of the Nolan Creek Watershed, Bell County, Texas.

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, P.E.  
Engineer

cc. Steve Bednarz  
Rex Isom



# The Agriculture Program

THE TEXAS A&M UNIVERSITY SYSTEM

Jack K. Williams Administration Bldg., Suite 113

2142 TAMU College Station, Texas 77843 2142

Phone 979.845.4747 Fax 979.845.9938 <http://agprogram.tamu.edu>

Office of the Vice Chancellor for Agriculture and Life Sciences

April 3, 2007

FILE COPY

*[Handwritten signature]*  
*[Handwritten signature]*

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, I have reviewed the Draft Plan Supplement and Environmental Assessment (EA) on the proposed rehabilitation of Floodwater Retarding Structure No. 15 of the Nolan Creek Watershed of the Leon River Watershed and Brazos River Basin, Bell County, Texas.

I have asked Dr. Allan Jones at the Texas Water Resources Institute to review the plans, and he has 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,

*[Handwritten signature of Elsa Murano]*

Elsa Murano  
Vice Chancellor and Dean,  
Agriculture and Life Sciences  
Director,  
Texas Agricultural Experiment Station

EM/rp

APR 05 2007

#### Universities

Prairie View A&M University—College of Agriculture and Human Sciences,  
Cooperative Agricultural Research Center, and Cooperative Extension Program  
Tarleton State University—College of Agriculture and Technology  
Texas A&M University—College of Agriculture and Life Sciences, College of Veterinary Medicine  
Texas A&M University—Commerce—Department of Agricultural Sciences  
Texas A&M University—Kingsville—Department of Agriculture and Human Sciences  
West Texas A&M University—College of Agriculture, Nursing, and Natural Sciences

#### Agencies

Texas Agricultural Experiment Station  
Texas Agricultural Extension Service  
Texas Forest Service  
Texas Veterinary Medical Diagnostic Laboratory  
Texas Wildlife Damage Management Service

## **Discussion and Disposition of Comments from letters received on the Draft Supplemental Watershed Plan and Environmental Assessment**

Not all agencies and groups requested to comment on the Draft Supplemental Watershed Plan and Environmental Assessment submitted comments. The responding agencies and groups comments and the disposition of each are as follows:

### **Texas State Soil & Water Conservation Board**

**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

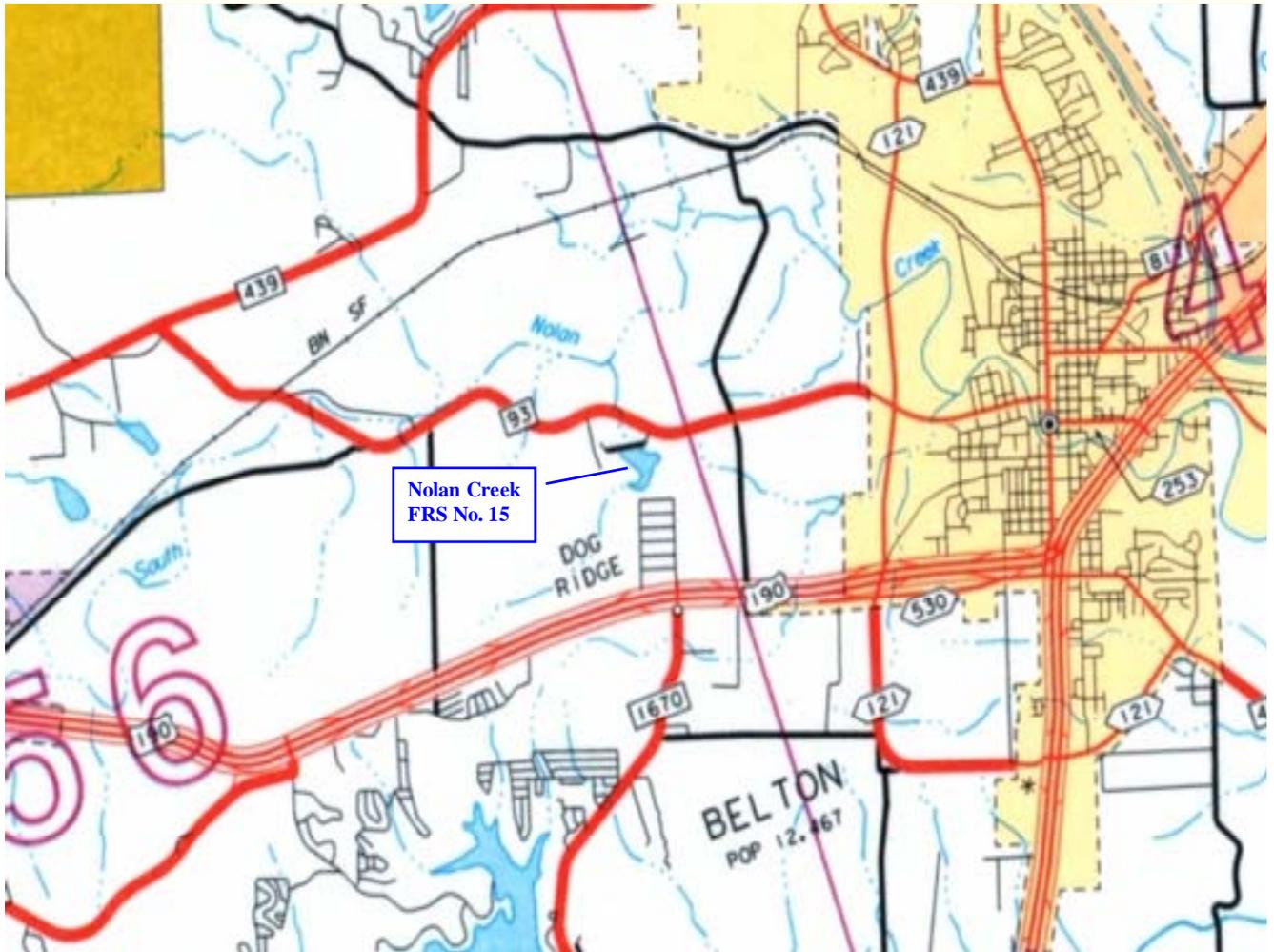
### **Texas Agricultural Experiment Station and Texas Water Resources Institute**

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

**Response:** Noted

# APPENDIX C

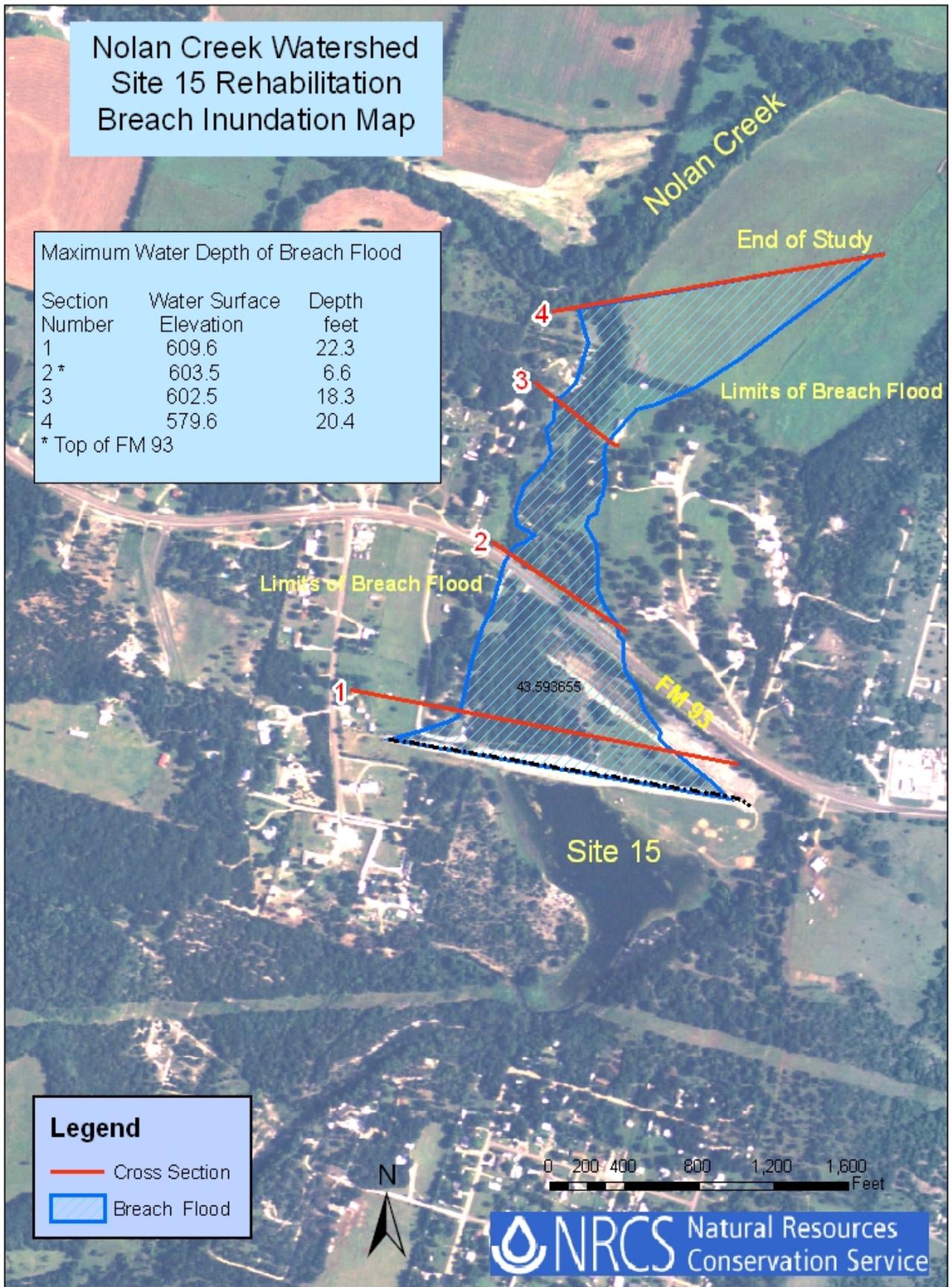
## VICINITY MAP



# Nolan Creek Watershed Site 15 Rehabilitation Breach Inundation Map

Maximum Water Depth of Breach Flood		
Section Number	Water Surface Elevation	Depth feet
1	609.6	22.3
2*	603.5	6.6
3	602.5	18.3
4	579.6	20.4

\* Top of FM 93



**Legend**

- Cross Section
- Breach Flood

## APPENDIX D

### Investigation and Analysis

Table H displays the effects of the recommended plan on particular types of resources that are recognized by certain Federal policies.

<b>Table H - Effects of the Recommended Plan on Resources of National Recognition</b>		
<b>Types of Resources</b>	<b>Principal Sources of National Recognition</b>	<b>Measurement of Effects</b>
Air Quality	Clean Air Act, as amended (42 U.S.C. 7401 et seq.)	No Effect
Areas of Particular Concern within the Coastal Zone	Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.)	Not present in planning area
Endangered & Threatened Species Critical Habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)	Not present in planning area
Fish & Wildlife Habitat	Fish and Wildlife Coordination Act (16 U.S.C. Sec. 661 et seq.)	No Effect
Flood Plains	Executive Order 11988, Flood Plain Management	No Effect
Historical & Cultural Properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. Sec. 470 et seq.)	Not present in planning area
Prime & Unique Farmland	CEQ Memorandum of August 1, 1980: Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act, Farmland Protection Policy Act of 1981.	No Effect
Water Quality	Clean Water Act of 1977 (33 U.S.C. 1251 et seq.)	No Effect
Wetlands	Executive Order 11990, Protection of Wetlands; Clean Water Act of 1977 (33 U.S.C. 1251 et seq.) Food Security Act of 1985	No Effect
Wild & Scenic Rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271 et seq.)	Not present in planning area

#### **Economics:**

In general, the NED benefits presented in this supplemental plan were developed based on Principles and Guidelines utilizing methods of (1) updating original flood damage reduction benefits; (2) maintaining property values; (3) maintaining incidental recreation benefits; and (4) avoiding the consequences of a sponsor's breach.

For flood damage reduction benefits, original damages with and without project were obtained from the 1962 work plan as supplemented in 1966. Origins for these damages were compared with field notes of current land uses downstream of FRS No. 15. Extent of damages was adjusted due to changes in land use. Adjusted damages were updated using appropriate indices (prices paid by producers, prices received by producers, consumer price index, and construction cost index). The difference in damages with and without project results in benefits. Based on this analysis, updated flood damage reduction benefits were estimated to be \$49,500 annually.

Concerning effects of the alternatives to downstream/upstream land values, a local realtor was contacted and asked to provide projections regarding the potential for future development downstream as well as upstream of the dam (i.e. adjacent to the sediment pool). Land below the dam to the north of FM 93 is in Temple ETJ. The property to the south of FM 93 that includes FRS No. 15 and the drainage area for FRS No. 15 is located in Belton ETJ and is being studied for annexation into the Belton City Limits. It is anticipated that these areas will be developed within 10 years. Under the Future Without Project (FWOP) alternative (sponsor's breach), any future development downstream would be altered to insure no development takes place within

the enlarged 100-year floodplain. About 8 acres would be added to the modified 100-year floodplain. Since no inhabitable development could take place within the 100-year floodplain, the fair market value for this acreage would be affected negatively. Fair market land values within the project area were obtained from the 2006 Bell County Appraisal District. As mentioned earlier, the project area is located either within the City of Temple's ETJ or the City of Belton's ETJ. Thus, land suitable for development that fell within the adjusted 100-year floodplain could not be developed. For purposes of the analysis, land values were discounted for 10 years. Discounted values were then amortized over the evaluated life (100 years) at 4.875%. Benefits accrued to the project by maintaining the current 100-year floodplain and allowing future development to occur. The difference between the values of the developable properties with the dam versus the values of the developable properties without the dam is benefits, which were estimated to be \$6,900 annually.

Incidental recreation benefits were based on current activities at FRS No. 15 and the downstream farm pond. Access to the sediment pool and the farm pond is allowed primarily for fishing purposes, although opportunities are limited. A conservative estimate for recreational activities is about 100 visitor days per year. Using information from the Forest Service publication "Updated Outdoor Recreation Use Values on National Forests and Other Public Lands" (October, 2005), mean value of fishing (per person per day) for Southeast area studies was \$79.21 (2004 value). However, because of the limited opportunities for fishing activities, only half of the value was used, or \$39.61 per day. Under the FWOP Alternative, fishing opportunities would cease, resulting in a loss of 100 visitor days annually. This equates to a value of \$3,300 annually, which in turn would be maintained, and thus a benefit of rehabilitation of FRS No. 15.

Principal spillway flow due to the rehabilitation of FRS No. 15 would not overtop the farm pond dam at a more significant rate than under existing conditions (one to five year events). Therefore, from experience the landowner is fully aware of the consequences of overtopping from principal spillway flow. Visits with the landowner indicated that the farm pond will be maintained in order for the fisheries recreation benefits to continue. Due to the importance of this benefit, it was assumed that such benefit would continue dependent upon the capability of the farm pond to sustain fisheries habitat. Because of the length of the evaluation period (100 years) and the frequency of overtopping from principal spillway flow, repair costs to the farm pond over the evaluation period were estimated. It was estimated that it would cost about \$2,000 (current dollars) to periodically repair the farm pond embankment. Using a life expectancy of ten years for the farm pond and a 50% cost increase per interval of 10 years, total costs over the evaluation period were estimated. These costs were discounted to present value, summed, and then amortized at 4.875% to obtain an annual cost. The annual cost (including annual operation and maintenance) came to less than \$400. This cost would be a non-project cost and not eligible for cost share assistance. However, given the scope of the project, it was determined that an annual cost of \$400 would be insignificant, and thus was not included in the NED account as a non-project cost.

The cost of breaching the dam under the FWOP alternative was considered a cost avoided benefit for the Decommissioning, Rehabilitation, and Relocation Alternatives. A breach by the sponsors of FRS No. 15 was estimated to cost \$262,500. Also, due to the absence of flood protection, the farm pond downstream would be damaged beyond repair from a one year storm or greater. This, too, would be a cost avoided benefit for Alternatives 2-4. Amortizing these and other associated costs over 100 years at 4.875% results in an annual cost of \$15,000, which results in a cost savings (benefit).

## Hydrology:

Dam breach modeling performed for this project demonstrated that some loss of life could occur as a result of dam failure and, as a result, the hazard classification for the dam is high hazard class (c). This classification requires that the dam meet two basic criteria:

- The 100-year, 1-day Principal Spillway Hydrograph (PSH) storm event can not overtop the auxiliary spillway; and
- The PMP does not overtop the dam.

The design to meet these criteria required determining event flow rates for the watersheds above and immediately below the structure. This was accomplished by the use of a TR-20 model. The dam hydraulic and hydrologic site computer analysis program SITES was used to develop storage-discharge relationships, set the top of dam, auxiliary and principal spillway crests, and conduit dimensions for the Site 15 rehabilitation alternatives. The two alternatives studied were the 6-hour PMP with a rainfall of 30.6 inches and the 24-hour rainfall, 5 point distribution of 43.70 inches. The 6-hour storm proved to be the most conservative design of the stability and integrity of the dam and auxiliary spillway. Simplified Dam Breach Routing Procedures (TR-66) were used to develop a breach hydrograph of Site 15. Fair weather conditions were assumed to develop the breach hydrograph. The reservoir pool elevation was static at top of dam with non-storm conditions downstream. Event flow rates from the TR-20 model and the breach hydrograph were used in a previously developed HEC-RAS model of Nolan Creek to define impacts and benefits associated with project alternatives. These models are available as part of the supporting documentation developed for this planning study.

The subtasks performed are summarized as follows:

- Assembly of existing relevant geographic information system (GIS) data into a project database;
- Delineation of the Nolan Creek Dams and Nolan Creek Watershed
- Estimation of rainfall depths for event and design storms
- Estimation of watershed time of concentration,  $T_c$
- Estimation and calibration of watershed curve numbers
- Estimation of channel loss factors
- Use SITES program to evaluate Site 15 rehabilitation alternatives
- Estimation of flow rates using the computer model TR-20
- Development of Site 15 breach hydrograph
- Estimation of downstream water surface elevations using the computer model HEC-RAS

## Engineering:

Engineering planning efforts were completed to meet the following rehabilitation project purposes:

- Maintain present level of flood control benefits.
- Comply with the current performance and safety standards.

The preferred alternative which best meets the purposes and need for the project is rehabilitation of the dam by construction of dam safety modifications developed to address dam safety deficiencies consistent with the dam's high hazard classification. Designed dam safety modifications include raising the dam 2.7 feet and adding an additional principal spillway hooded inlet with 30" conduit. The entrance section of the auxiliary spillway will be modified for better alignment.

Engineering work items completed as part of the development of this planning study include:

- Gathering and reviewing existing site data.
- Identifying problems, opportunities, and concerns.
- Conducting planning studies, including:
  - Analyzing existing data
  - Conducting field investigations to evaluate the condition of existing structures and obtain additional data (e.g., survey and geotechnical data)
  - Developing topographic mapping for the watershed
  - Conducting bathymetric surveys for sediment yield analyses
  - Conducting and assisting engineering, environmental, geologic, hydrologic, hydraulic, social, and economic analyses in accordance with the requirements of NRCS design criteria (e.g., national engineering handbook, technical releases, technical notes, design notes, SITES software, TR20 software)
- Developing design layouts and cost estimates for evaluation of design alternatives including:
  - No Action or Future Without Project
  - Decommission of dam
  - Rehabilitation of dam:
    - Raising top of dam
    - Increasing principal spillway capacity
    - Upgrading auxiliary spillway
- Developing inundation maps for impact comparisons associated with the proposed design modifications.
- Providing public involvement support services, including coordinating with local NRCS offices, site landowners, sponsors, and the public; preparing presentations to the public; and attending public meetings.
- Preparing a Supplemental Watershed Plan and Environmental Assessment for the project sponsors.

## **Environmental – Wetlands and Fish/Wildlife Habitat:**

During the planning process, an evaluation was undertaken to determine what effects or consequences the selected alternatives would have on the environment. NRCS biologists and hydraulic engineers conducted multiple field reviews and determined that best professional judgment was appropriate to make fish and wildlife habitat determinations.

The existing on-site wetland system is composed of shallow and deep water habitats with an on-channel farm pond located approximately 1,800 feet downstream of the floodwater retarding structure. Hydrophytic vegetation is growing along the lower section of the auxiliary spillway and in the stream channel directly below the dam due to a seep at the base of the dam. NRCS biologists determined that the soils on the auxiliary spillway are not hydric soils, and the hydrophytic vegetation below the dam would be classified as in-stream vegetation. The wet area caused by the seep would not meet the definition of a wetland under the Clean Water Act and is not a jurisdictional wetland.

NRCS hydraulic engineers determined that the downstream farm pond is currently overtopped by flows from storm events classified as one to five year events. The farm pond has an uncontrolled drainage area of approximately 84 acres that remains constant regardless of activities at Nolan Creek FRS 15. Additionally, the existing culvert under Highway 93 acts as a buffer retarding flows greater than approximately 200 cubic feet per second. The flows through the Highway 93 culvert were calculated with the culvert partially blocked. The Texas Department of Transportation was contacted, and it stated that there are no plans in place to remove the sediment that is currently blocking the culvert. If Nolan Creek FRS 15 were removed, flows from the two-year event and greater would overtop Highway 93. For these reasons, NRCS biologists determined that:

- Increased flows from Alternatives 1 and 2 would overtop Highway 93 and also overtop the farm pond dam causing a breach, and thus the conversion of the farm pond to riverine habitat,
- Alternatives 1 and 2 would convert all open water habitat to ephemeral riverine habitat,
- While Alternative 3 increases flows over existing conditions, flows would not overtop Highway 93 and overtopping of the downstream farm pond dam would not occur at a more significant rate than under existing conditions,
- Alternative 3 would have only minor temporary adverse impacts to existing fish and wildlife habitats,
- Alternative 4 would not change flow rates at the downstream farm pond, and
- Alternative 4 would have only minor impacts to current fish and wildlife habitat but would provide long term protection of habitats in the downstream greenbelt.

## APPENDIX E

### Consultation and Public Scoping Process

#### Summary of Consultation and Public Scoping Process

Integral to the planning process is the solicitation of public comments to identify, understand, and address the issues and concerns of the relevant agencies and the public. The sponsors' intent during the scoping process was to inform agencies and the public about the planning process and solicit their comments in order to identify issues and questions to consider when developing the Supplemental Watershed Plan and Environmental Assessment. During the scoping period, the sponsors announced the commencement of the planning process through various means, invited written comments, and held a public scoping meeting. Opportunities for the public to participate in the planning process occurred at key milestones throughout the process. This appendix describes the planning for and results of the scoping process.

Original sponsors include Bell County WCID No. 6 and the Central Texas Soil and Water Conservation District. At the initiation of the planning process, meetings were held with representatives of the sponsors to ascertain their interest and concerns regarding the rehabilitation of FRS No. 15 of the Nolan Creek Watershed. The initial steering committee meeting was held on September 25, 2006, with sponsors, NRCS, and the invited public and steering committee present to discuss purposes and requirements of the rehabilitation program. Issues and concerns of the sponsors and an initial outline of the public scoping process were also reviewed. Bell County WCID No. 6 agreed to serve as the "lead sponsor," being responsible for leading the planning process with assistance from NRCS. Informal discussions amongst the sponsors, NRCS, and landowners were conducted throughout the entire planning period.

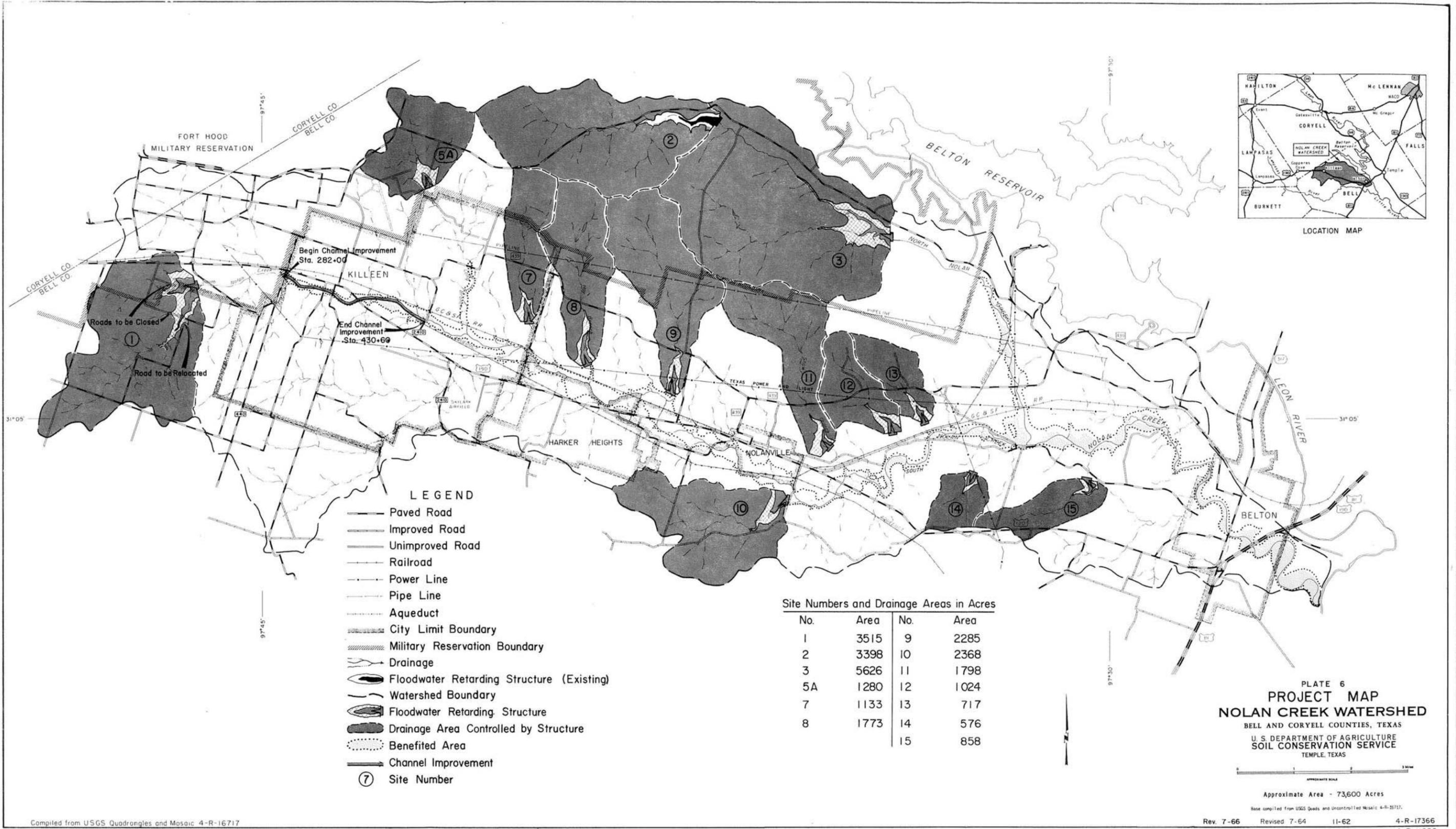
The scoping process was continuous and comments were solicited and received for consideration throughout the entire planning procedure.

A second steering committee meeting was held in January, 2007 to review the results of the scoping process to date and to present potential alternative solutions to bring FRS No. 15 into compliance with current dam safety criteria. Through verbal and written comments, meeting participants provided input on issues and concerns to be considered in the planning process. Federal, State, and local agencies all participated in the scoping planning process.

A review of National Environmental Policy Act (NEPA) concerns was initiated at the first steering committee meeting and was a major topic of discussion and concern throughout the entire planning process. NEPA concerns were reviewed and documented. Coordination with the State Historic Preservation Office (SHPO) was performed through written and verbal communications and a survey of the area of potential effects (APE) was prepared by the NRCS.

The United States Fish and Wildlife Service web site was visited to obtain an official list of the federally-listed threatened and endangered species known to exist in Bell County, Texas. The findings are shown in Table C found on page 13 of this document.

## APPENDIX F Project Map



Site Numbers and Drainage Areas in Acres

No.	Area	No.	Area
1	3515	9	2285
2	3398	10	2368
3	5626	11	1798
5A	1280	12	1024
7	1133	13	717
8	1773	14	576
		15	858

**PLATE 6**  
**PROJECT MAP**  
**NOLAN CREEK WATERSHED**  
 BELL AND CORYELL COUNTIES, TEXAS  
 U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE  
 TEMPLE, TEXAS

APPROXIMATE SCALE  
 0 1 2 3 Miles  
 Approximate Area - 73,600 Acres

Compiled from USGS Quadrangles and Mosaic 4-R-16717

Rev. 7-66    Revised 7-64    11-62    4-R-17366  
 Revised 11-62    4-R-11885