



United States  
Department  
Of Agriculture

Natural  
Resources  
Conservation  
Service

**FINAL  
SUPPLEMENTAL  
WATERSHED PLAN No. 1 &  
ENVIRONMENTAL ASSESSMENT**  
For  
**Rehabilitation of Floodwater Retarding  
Structure No. 5  
Of The  
Martinez Creek Watershed  
Bexar County, Texas**

---

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

In Cooperation With:  
Alamo Soil and Water Conservation District  
San Antonio River Authority

JULY 2003

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (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 USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

# FINAL

## SUPPLEMENTAL WATERSHED WORK PLAN AGREEMENT NUMBER 1

Between the

**Alamo Soil and Water Conservation District**  
Local Organization

**San Antonio River Authority**  
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 Martinez Creek Watershed, State of Texas, executed by the Sponsoring Local Organization named therein and the Service, became effective on the 7<sup>th</sup> day of August, 1959; 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. 5 beyond its evaluated life, it has become necessary to modify said watershed agreement; and

Whereas, the rehabilitation of said FRS No.5 has been authorized under the authority of the Watershed Protection and Flood Protection act (PL83-566) as amended by the Watershed Rehabilitation Amendments of 2000 provides the authority for rehabilitation; and

Whereas, it has become necessary to modify said watershed work plan by modifying Floodwater Retarding Structure (FRS) No. 5 to bring it up to current performance and safety standards; and

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

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

(1). Paragraph No. 14 is added to the plan agreement with respect to the Rehabilitation of Floodwater Retarding Structure (FRS) No. 5:

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

<u>Rehabilitation of</u>	<u>Sponsors</u>	<u>NRCS</u>	<u>Estimated Project Cost</u>
FRS No. 5	35 %	65 %	\$924,800

NRCS is responsible for the engineering services and project administration costs (\$241,800) it incurs. However, these costs are not used in the calculation of the federal cost share. Therefore, they are not included in Estimated 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 Organization and are not counted toward local cost share. See Table 2 in Appendix E for a complete distribution of total rehabilitation costs.

An amount up to the percentage rate specified may be satisfied by the Sponsoring Local Organization 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 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.

(2). Paragraph No. 15 is added to the plan agreement as follows:

The sponsors will obtain all necessary federal, state and local permits required by law, ordinance, or regulation for installation of the works of improvement. The costs of such permitting is not eligible as part of the sponsors cost-share requirements.

(3). Paragraph No. 16 is added to the plan agreement as follows:

The sponsors will be responsible for the costs of water, mineral, and other resource rights and will acquire or provide assurance that landowners or resource users have acquired such rights pursuant to state law as may be needed in the installation and operation of the works of improvement. The costs associated with the subject rights are not eligible as a part of the sponsors cost-share requirement.

(4). Paragraph No. 17 is added to the plan agreement as follows:

The sponsors will be responsible for the operation, maintenance and replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work. The term of this new O&M agreement will be for a period of 100 years, which is the life expectancy of the project.

(5). Paragraph No. 18 is added to the plan agreement as follows:

The sponsors hereby agree that they will 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 implemented by 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 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. In any event, the sponsor agrees that it will reimburse owners for necessary expenses as specified in 7 C.F.R. 21.1006 (c) and 21.1007.

(6). Paragraph No. 19 is added to the plan agreement as follows:  
The sponsors agree to participate in and comply with applicable Federal flood plain management and flood insurance programs before construction starts.

(7). Paragraph No. 20 is added to the plan agreement in accordance with the certification regarding drug-free workplace requirements (7CFR 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 (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.

(8). Paragraph No. 21 is added to the plan agreement in accordance with the certification regarding lobbying (7 CFR 3018) 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 subawards at all tiers (including subcontracts, subgrants, 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, 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.

(9). Paragraph No. 22 is added to the plan agreement in accordance with the certification regarding debarment, suspension, and other responsibility matters - primary covered transactions (7 CFR 3017) 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 Sponsors and NRCS further agree to all other terms, conditions, and stipulations of said watershed agreement not modified herein.

**Alamo Soil and Water Conservation District**  
Local Organization

By Fred Neumann  
Title Chairman  
Date 8-5-03

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

Inung Ernst  
(Secretary, Local Organization)  
Vice-Chairman

---

**San Antonio River Authority**  
Local Organization

By Gregory & Rother  
Title General Manager  
Date 8-25-03

The signing of this agreement was authorized by a resolution of the governing body of the San Antonio River Authority adopted at a meeting held on 1-16-02.

Asst. Secretary  
Asst. (Secretary, Local Organization)

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

Approved By Larry D Butler  
NRCS State Conservationist  
Date 9/5/03

# TABLE OF CONTENTS

<u>Section Title</u>	<u>PAGE</u>
Supplemental Watershed Plan Agreement -----	iii-viii
Summary of Supplemental Plan/Environmental Assessment -----	2
Environmental Assessment -----	5
Introduction -----	5
Purpose and Need -----	5
Project Setting -----	6
Problems & Opportunities -----	11
Scope of Environmental Assessment -----	12
Formulation of Alternatives -----	12
Effects of Alternatives -----	16
Comparison of Alternatives -----	25
Risk & Uncertainty -----	27
Rationale for Plan Selection -----	27
Consultation & Public Participation -----	28
Recommended Plan -----	31
Compliance with Local, State & Federal Laws -----	31
Operation and Maintenance -----	31
Financing Arrangements -----	32
List of Preparers -----	33
References -----	34
<b>Appendixes</b>	
Appendix A – Comment letters received on the Draft Supplemental Plan/Environmental Assessment -----	36
Appendix B – Vicinity Map -----	37
Appendix C - Breach Inundation Map -----	38
Appendix D - Project Map -----	39
Appendix E – Tables 1-6	
<b>List of Tables</b>	
Table A – Identified Concerns -----	12
Table B - Concerns Addressed by Alternatives -----	24
Table C - Comparison of Alternatives -----	25
Table D - Summary of Benefits -----	26
Table 1 – Estimated Installation Cost -----	40
Table 2 - Estimated Cost Distribution-Structural and Non-Structural Measures -----	41
Table 3 – Structural Data -----	42
Table 4 – Annual Costs -----	43
Table 5 – Estimated Average Annual Flood Damage Reduction Benefits -----	44
Table 6 – Comparison of Benefits and Costs for Structural Measures -----	45

## **SUMMARY OF SUPPLEMENTAL PLAN/ENVIRONMENTAL ASSESSMENT**

**Project name:** Rehabilitation of Floodwater Retarding Structure (FRS) No. 5, Martinez Creek Watershed, Bexar County, Texas

**Sponsors:** Alamo Soil and Water Conservation District and the San Antonio River Authority

**Description of recommended plan:** The preferred alternative is the Rehabilitation of FRS No. 5 by raising the top of dam 3.7 ft and installing a roller compacted concrete curtain in the auxiliary spillway to comply with current performance and safety standards and extending the service life of the dam. The evaluated life of the structure will be extended for an additional 100 years.

### **Resource Information:**

**Size of planning area:** 1,830 acres

**Prime and Important farmland (acres):** None

**Number of minority farmers:** None

**Wetlands:** 33 acres of open water (Lacustrine) wetland (current pool area of FRS No. 5)

**Endangered species:** None

**Cultural resources:** None known

**Problem identification:** Urban development since FRS No. 5 was constructed has resulted in the dam not meeting current dam safety standards. Failure of the dam would result in significant property damage and potential loss of life. Approximately 500-600 people downstream are at risk should the dam fail. This is a conservative figure, considering public properties, including a church and a day care center, are within the breach area. However, this does not include motorists on Kitty Hawk Road, located immediately below the dam.

**Alternative plans considered:** Alternative plans considered were (1) No Action or Future Without Action (Controlled Breach of FRS No. 5); (2) Decommission of FRS No. 5 (Remove the footprint of FRS No. 5); (3) Relocation of properties at risk downstream located within breach area of the dam; (4) Rehabilitation of FRS No. 5 by raising the top of dam 3.7 ft and installing a roller compacted concrete curtain in the auxiliary spillway; (5) Rehabilitation of FRS No. 5 by adding an additional 200 ft wide auxiliary spillway and raising top of dam 2.1 ft and (6) Rehabilitation of FRS No. 5 by installing a roller compacted concrete spillway over top of dam and raising effective height of dam 2.5 ft.

### **Brief description of each alternative:**

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

This alternative consists of making a breach in the dam of sufficient size to safely pass the 100-year flood event. The breach location will necessitate removal of the principal spillway components. The material (about 84,000 cu yd) would be placed in the present

easement area. Exposed area (about 40 acres) would be vegetated for erosion protection. The upstream and downstream channel would be reconnected. No other work upstream would be performed. The land formerly used by the project would be available for use as a park use. This action would necessitate Universal City to modify the bridge on Kitty Hawk Road and San Antonio River Authority (SARA) to stabilize the stream channel. The estimated cost of this option is \$813,000.

**Alternative No. 2 - Decommission FRS No. 5.**

This alternative consists of removing the footprint of the dam as much as possible. The principal spillway and the earthen embankment will be removed. Material will be placed in the sediment and detention pools and the auxiliary spillway. All exposed areas will be vegetated as needed for erosion protection (30 acres). Riparian vegetation will be established along the stream (17 acres). Channel work including any needed grade stabilization structures will be installed to reconnect the stream channel through the sediment pool. This action would necessitate Universal City to modify the bridge on Kitty Hawk Road and SARA to stabilize the stream channel. Estimated cost is \$1,980,900.

**Alternative No. 3 - Relocation of downstream properties.**

This alternative consists of relocating 106 downstream properties that would be at risk due to a catastrophic breach of FRS No. 5. Approximately 99 residential, 4 public, and 3 commercial properties would be relocated out of the breach area to other areas of the city. This action would necessitate Universal City to modify the bridge on Kitty Hawk Road. Estimated cost is \$17,629,700.

**Alternative No. 4 - Rehabilitation of FRS No. 5 by raising the top of dam 3.7 ft and installing a roller compacted concrete curtain in the auxiliary spillway.**

This alternative consists of modifying the structure to meet current performance and safety standards for a high hazard dam. This requires vertically raising the dam's peak elevation by 3.7 feet and installing a roller compacted concrete curtain in the auxiliary spillway to accommodate dam safety criteria. The detention pool area would increase slightly. Estimated cost is \$1,166,600.

**Alternative No. 5 - Rehabilitation of FRS No. 5 by adding an additional 200 ft wide auxiliary spillway and raising top of dam 2.1 ft.**

This alternative consists of modifying the structure to meet current performance and safety standards for a high hazard dam. This requires constructing an additional auxiliary spillway on the east side of the dam, and raising the top of dam by 2.1 feet. Estimated cost is \$1,937,300.

**Alternative No. 6 - Rehabilitation of FRS No. 5 by installing a roller compacted concrete spillway over top of dam and raising top of dam 2.5 ft.**

This alternative consists of modifying the structure to meet current performance and safety standards for a high hazard dam. This requires adding sufficient additional auxiliary spillway capacity by installing an auxiliary spillway over the top of the earthen embankment to pass the flow from the Probable Maximum Flood. In addition the effective height of the top of the dam will be raised 2.5 feet. Estimated cost is \$1,594,100.

**Project purpose:** Flood Prevention.

**Principal project measure:** Rehabilitation of FRS No. 5.

<b>Project costs:</b>	<u>Federal funds</u>	<u>Other Funds</u>	<u>Total</u>
	\$842,900	\$323,700	\$1,166,600

**Structural measure:** Rehabilitation of FRS No. 5 by raising the top of dam 3.7 ft and installing a roller compacted concrete curtain in the auxiliary spillway.

**Project benefits:** Economic benefits of the project are derived from assuring the continued performance of FRS No. 5 by meeting current performance and safety standards. Benefits are based on continuing protection to the downstream area, maintaining upstream property values, and avoiding projected costs associated with the absence of FRS No. 5. Total average annual benefits are estimated to be \$80,100, which include updated original downstream benefits (\$11,700), avoiding devaluation of upstream property values (\$20,400), avoiding loss of recreation benefits (\$37,400), and elimination of the need to modify Kitty Hawk Road (\$10,600). Also, potential loss of life (500-600 residents located within breach area) from a dam failure would be alleviated.

**Other impacts:** The aesthetics of the area, the wetland values and the recreational opportunities will be maintained. Current upstream property values will be unaffected. In the absence of FRS No. 5, eighty-four properties located upstream would experience reduced values.

**Land use changes:** There will be no land use changes as the area is now urban.

**Environmental values changed or lost:** No compensatory mitigation is planned. Installation of the preferred alternative will disturb only a minimal amount of grassland vegetation. Disturbed areas will be replanted with coastal bermudagrass.

**Wetlands:** None

**Fisheries:** None

**Cultural Resources:** None

**Prime farmland:** None

# **FINAL SUPPLEMENTAL WATERSHED PLAN No. 1 & ENVIRONMENTAL ASSESSMENT**

## **INTRODUCTION**

The Martinez Creek Watershed Plan was approved for operation in August 1959 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 of the watershed project are Alamo Soil and Water Conservation District and the San Antonio River Authority. Federal assistance is being provided by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).

The watershed, located in Bexar County, Texas, is comprised of 56,000 acres (about 87.5 square miles). A total of six floodwater retarding structures were constructed in the watershed during 1962 through 1966.

Within the Martinez 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 Floodwater Retarding Structure (FRS) No. 5. FRS No. 5 provides flood prevention and other benefits. Because of urbanization, there is a potential loss of life (500-600 residents located within the area plus motorist on Kitty Hawk Road) that has caused FRS No. 5 dam hazard classification changed from a low hazard classification to a high hazard classification. The dam does not meet current performance and safety standards under this classification.

This Supplemental Watershed Plan and Environmental Assessment is prepared to implement the rehabilitation of FRS No. 5 in order meet current performance and safety standards. The Watershed Protection and Flood Protection act (PL83-566) as amended by the Watershed Rehabilitation Amendments of 2000 provides the authority for rehabilitation. The service life of FRS No. 5 will be extended for an additional 100 years.

## **PURPOSE AND NEED**

The purposes of FRS No. 5 rehabilitation are to maintain present level of flood control benefits and comply with the current performance and safety standards. FRS No. 5 was built in 1964 in a rural setting and is now surrounded by urban development. In particular, there are approximately 99 residential, 4 public, and 3 commercial properties located downstream within the breach area. People within these properties would be at risk should the dam fail. Also, motorists on Kitty Hawk Road below the dam would be in harm's way. Because of urban encroachment, there is a need to protect downstream life, properties and infrastructure, reduce the risk of potential of loss of life, maintain property values upstream, and maintain water-based recreation opportunities. The rehabilitation of FRS No. 5 would ensure the service life of the dam for a minimum of 100 years.

## PROJECT SETTING

This Supplemental Plan/Environmental Assessment is for the watershed upstream of FRS No. 5 and the downstream area affected by a breach of the existing dam (Appendix C). FRS No. 5 is constructed in the upper reaches of Salitrillo Creek, a tributary of Martinez Creek. A description of the Martinez Creek Watershed can be found in the Martinez Creek Watershed Plan dated October 1958.

FRS No. 5 continues to function as planned and is an integral part of the City of Live Oak's City Park, which is adjacent to FRS No. 5. Approximately 15,000 people visit the park each year, of which an estimated 1,350 utilize the sediment pool for fishing, migratory bird watching, and other water-based activities. The sediment pool has become a focal point of the park for picnicking, fishing, scenic views, migratory bird watching, wildlife viewing, and tranquil walks around the lake. The dam and lake also serve as an amenity to the entire park system.

FRS No. 5 has a drainage area of about 1,830 acres. The majority of the area is located within the city limits of Live Oak, Bexar County, Texas. A portion of the structure is located within the city limits of Universal City, Bexar County, Texas. All of the 1,830 acres is either urbanized or projected to be urbanized within the near future. Land use is residential, commercial, lakes, park and open areas.

Average annual rainfall is slightly less than 28 inches. Normal temperatures range from an average high of 94 degrees Fahrenheit in July and August to an average low of 42 degrees in January. The normal frost-free period of 279 days extend from February 24 to November 30.

### **Description of Existing Dam**

FRS No. 5 was constructed in 1964 and has a drainage area of 1,830 acres. It was constructed as an earth fill dam with a vegetated auxiliary spillway. The principal spillway is a 30-inch diameter reinforced concrete pipe with stand and inlet. Flow is restricted by an orifice plate covering the top of the inlet. Two 10-inch by 10-inch weir notches in the side wall of the inlet, set at 0.8 ft below the principal crest elevation, drain the detention pool. The total storage capacity below the elevation of the auxiliary spillway is 1,030 acre-feet with 259 acre-feet reserved for sediment accumulation over a 50-year period. The remaining 771 acre-feet was reserved for floodwater detention storage. The maximum height of the dam is 40 feet. The surface area of the sediment pool is about 33 acres. The City of Live Oak operates and maintains a city park adjacent to the detention pool of the structure.

Investigations indicate that the dam, including the principal spillway, is structurally sound and is being properly maintained. A recent sediment survey, completed in February 2002, indicates that there are 142 ac-ft of available sediment storage capacity remaining. This will allow sediment accumulation for more than 100 additional years. The sediment in the sediment and detention storage areas was not tested as it will not be disturbed during the rehabilitation of the structure.

The San Antonio River Authority built FRS No. 5 with assistance from the Natural Resources Conservation Service (NRCS) as part of the Martinez Creek Watershed Project. Martinez Creek Watershed, approved in 1959, provided watershed protection and agricultural flood reduction. The project also provided protection to roads and bridges. There was no planned protection to urban properties. The drainage area of the floodwater retarding structure was predominantly agriculture (cropland and grassland).

When Martinez Creek Watershed was planned, the original intent of the floodwater retarding structures was to protect agricultural areas downstream, which were classified as low-hazard in regards to threat to loss of life. Less than 1000 people lived in the basin and the economy was almost entirely agricultural. However, forty years later the population has grown exponentially with the cities of Live Oak and Universal City (population 9,200 and 14,800 respectively) now suburbs of the expanding San Antonio metropolitan area. With 500-600 people living and working in properties downstream as well as a major highway only several hundred feet below the dam, FRS No. 5 is now considered a high-hazard dam. When Martinez FRS No. 5 was built in the mid-1960s for flood prevention and watershed protection, no one could have imagined the extensive urban development that would occur. While the dam provides an estimated \$80,100 in annual monetary benefits, far more valuable are the human lives positively impacted through its presence. Therefore, due to this boom in development, the dam must be upgraded to meet current performance and safety standards and ensure continued protection of the watershed and the lives of people downstream. The watershed area of FRS No. 5 is completely developed to urban or projected to be completely developed in the near future.

FRS No. 5 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 the auxiliary spillway to a 2.7 percent chance of functioning in any year (37-year frequency).

The embankment is in excellent condition. A thick stand of coastal bermudagrass covers the front and back slopes and auxiliary spillway. SARA fertilizes the embankment as needed to maintain this protective cover. 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. Sedimentation of the reservoir was surveyed and 142 acre-feet remain. At the current sediment rate this will permit an additional 114 years of sediment storage. The dam has no stability or foundation problems. Due to the location of the dam very little or no risk of failure exists due to seismic activity. The auxiliary spillway has previously functioned at an approximate depth of two feet with no damage. This storm occurred in October 1998 and was estimated to be in the excess of a 500-year event.

The dam is recommended be raised 3.7 feet to prevent overtopping during the probable maximum flood (PMF) event. The state requires that a high hazard dam safely pass the hydrograph of the PMF. Currently the dam passes 25% of the PMF.

### **Geology and Soils**

Gently rolling hills of low relief characterize the topography in this portion of the Blackland Prairie. Rocks underlying the Martinez Creek Watershed are predominantly fine-grained siltstone, clay, and marl of Cretaceous and Eocene age. Upper Cretaceous Navarro Group and

Marlbrook Marl occur in the Central part of the watershed, while Pecan Group Chalk outcrops in the uppermost headwater region of the watershed. The Eocene Midway Group underlies the main channel of Martinez Creek in the downstream portion of the watershed. Coarser Quaternary terrace deposits occur along the watershed margins, with recent alluvium deposits in the stream valleys (Bureau of Economic Geology, 1983).

Alluvial soils in the valleys tend to be fine-grained because they are derived from the fine-grained bedrock. Clay deposits contain montmorillonite especially if derived from the lower portion of the Navarro Group (Bureau of Economic Geology, 1983). Those clays tend to have a high shrink-swell potential. The alluvium contains local thin layers and lenses of gravel.

Soils in the vicinity of the FRS No. 5 dam, spillway, and reservoir area are typical of the south central Texas rolling Blacklands. Moderately sloping to steep upland soils include Austin silty clay, Houston Black clay, and Stephen silty clay formed on Pecan Gap Chalk parent material. Trinity and Frio soils are found in the narrow stream valley alluvium.

The fine-grained rocks and soils, gentle topography and stable landuse suggest comparatively low sedimentation rates. Historic sedimentation rates in the vicinity of the watershed are comparatively low for Texas (Bernard et.al., 1995). A rate of 0.40 ac-ft/m<sup>2</sup>/yr will likely provide adequate future sediment storage at FRS No. 5.

### **Dam Safety**

FRS No. 5 has been identified as a high hazard dam as a result of (1) urban development in the area that will be potentially affected by a breach of the dam, and (2) Kitty Hawk Road, located downstream, a major transportation route in Universal City. Breach studies indicate that Kitty Hawk Road would be overtopped by approximately 7.3 feet if the dam failed, resulting in property and infrastructure damages. There are 99 residences, 3 businesses and 4 public entities downstream of the dam that would be at-risk in the event of a breach, resulting in 500-600 people being subjected to potential loss of life. The breach floodwater surface would be 3 feet or greater in several buildings, and many buildings, of which most are residential, would experience water depths between 1-3 feet. Because of the number of at-risk properties and the location of Kitty Hawk Road, the threat of loss of life downstream of the dam would be extreme.

Although the structure is presently sound, there is always the risk of failure. The most likely cause of FRS No. 5 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 34,000 cubic feet per second (cfs). See Appendix C, Breach Inundation Map.

### **Cultural Resources**

No prior cultural resources identification activities have taken place in association with the original Martinez FRS No. 5 project. The dam and reservoir was constructed in 1964, prior to passage and 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. Two tribes were listed that have land area claims that included Bexar County, Texas – the Mescalero Apache Tribe of the Mescalero Reservation, New Mexico and the Lipan Apache Tribe and Bands thereof. NRCS has contacted the Tribal Historic Preservation Officer to determine if the tribes have an interest in the project area.

A search of the Texas Archeological Sites Atlas, completed in February 2002, did not reveal any recorded archeological or historic sites in the vicinity of the proposed project. As the proposed rehabilitation project is a federally assisted undertaking, NRCS requested in a letter dated February 25, 2002, the input of the State Historic Preservation Officer (SHPO) toward meeting its responsibility to consider effects to historic properties that may be affected (letter on file). NRCS proposed to complete a cultural resources survey on all areas of new disturbance associated with the proposed project. By reply letter dated March 19, 2002 the SHPO concurred in the NRCS proposed approach for cultural resources consideration (letter on file).

The cultural resources survey was completed in February 2003. The NRCS has determined pursuant to 36 CFR 800.4(d) that there are no properties included in or eligible for the National Register of Historic Places within the area of potential effect (letter on file). The SHPO concurred in the determinations on March 13, 2003 (letter on file).

### **Prime Farmland**

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

### **Wildlife Resources**

FRS No. 5 is located with the city limits of Live Oak and Universal City in Bexar County, Texas. The watershed for this site is heavily urbanized. Landuse adjacent to the site is designated as a city park with heavy usage by surrounding homeowners. The University of Texas System owns the land to the south of FRS No. 5. The land cover is predominantly poor condition rangeland, low seral plant community infested with honey mesquite (*Prosopis glandulosa*) and Huisache (*Acacia smallii*). The area directly below the dam is an elm (*Ulmus sp.*), hackberry (*Celtis laevigata*), bois d arc (*Maclura pomifera*), mixed wood, herbaceous under-story thicket. The area along the northeast bank of the sediment pool is infested with green ash (*Fraxinus americana*). A small white-tailed deer (*Odocoileus virginianus*) population, small mammals, and neo-tropical songbirds and raptors may inhabit the immediate area. Migratory waterfowl frequent the impoundment during migration. Fisheries include a population of largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*) and various species of sunfish (*Lepomis sp.*). Texas Parks and Wildlife stock the impoundment annually as a site for "KID FISH", an event sponsored by the City of Live Oak.

## **Threatened and Endangered Species**

The proposed project is located in Bexar County where the black-capped vireo (*Vireo atricapillus*), golden cheek warbler, (*Dendroica chrysoparia*), and various species of karst dwellers, are known to occur or may occur. These species are listed as Endangered by the U.S. Fish and Wildlife (USFWS).

The project area is located approximately 1.5 miles southeast of Interstate 35 within the city limits of Live Oak, Converse, and Universal City. Vegetation consists of invader and low seral woody, grasses and forb species. Consultation with USFWS indicated that no known sighting or nests have been identified in the immediate area.

The project area is also located in Karst Zone 4. Karst Zone 3, 4 require a visual reconnaissance of the areas to be impacted for sinks or caves. Karst Zones 1, 2 have a high probability or possibility of known invertebrates and their desired habitat, and require specific USFW protocols by a qualified geologist or geohydrologist. Karst Zone 5 areas require no action. A visual reconnaissance of the areas to be impacted revealed no karst habitat, or karst dwelling species present.

## **Wetlands**

FRS No. 5 provides 33 acres of deep water (lacustrine) habitat. Water depth vary from greater than 6.6 feet at the deepest point, to very shallow at the upper reaches of the water body and along the shoreline. The waters within the sediment pool provide both deep and shallow water habitats for many aquatic dependent species. Riverine system down stream of the structure has been altered by channelization below Kitty Hawk Road. Stream channels above the site, below the site to Kitty Hawk Road, and below the channeled area are narrow and limited to flow only during periods of moderate to heavy rainfall.

## **Status of Operatlon and Maintenance**

San Antonio River Authority is responsible for the operation and maintenance of FRS No. 5. The Alamo Soil and Water Conservation District provides assistance, as needed, in the operation and maintenance. Inspections of the dam indicated that the dam is being operated and maintained properly. The City of Live Oak is actively working to keep sedimentation and increased flooding from development to a minimum.

The embankment is in excellent condition. A thick stand of coastal bermudagrass covers the front and back slopes and auxiliary spillway. SARA fertilizes the embankment as needed to maintain this protective over. 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.

## PROBLEMS AND OPPORTUNITIES

The basic concern is the safety of FRS No. 5 and the potential problems that failure of the dam would cause. The primary objective of the project is to minimize the risk of failure and to assure that the structure will continue to function safely in the future.

Although FRS No. 5 is functioning as originally planned and providing downstream flood protection, there is a possibility of the dam failing from overtopping if a storm occurs greater than the structure was constructed to control. If the dam fails, Kitty Hawk Road, a major traffic thoroughfare, would be overtopped by approximately 7.3 feet of water at a maximum velocity of 6 feet per second. Estimated damages from a breach of FRS No. 5 would exceed \$8.5 million. Any vehicles on Kitty Hawk Road would be washed downstream, the road surface would be damaged, and the Kitty Hawk Road bridge would most likely be washed away. Traffic would be disrupted while the bridge and the roadway was repaired. Approximately 84,000 cubic yards of fill material from the dam would be moved downstream clogging stream channels and increasing flooding. Dam failure would result in the loss of the 33 acres of open deep water (lacustrine) habitat wetland that presently provides fish and waterfowl habitat and enhances property values around the lake. A local realtor estimated that removal of FRS No. 5 would reduce property values an average of five percent.

## SCOPE OF ENVIRONMENTAL ASSESSMENT

A scoping process was used to determine the issues significant in defining the problems, and formulating and evaluating alternatives. Scoping included a public meeting, written request for input from state, local and federal agencies, and a coordination meeting with appropriate agencies. A steering committee of sponsors and local citizens was also formed to solicit input.

Table A presents the results of the scoping process.

<i>Table A – Identified Concerns</i>			
Economic, social, environmental, and cultural concerns	Degree of Concern	Degree of Significance to Decision Making	Remarks
Dam Safety	High	High	
Human Health & Safety	High	High	
Flood Damages	High	High	
T&E Species	High	Medium	No Impact
Cultural Resources	High	Medium	No Impact
Prime Farm Lands	Low	Low	None Present
Wetlands	High	High	
Air Quality	Low	Low	
Water Quality	Medium	Medium	
Water Quantity	High	Medium	
Aesthetics	High	Medium	
Sedimentation	Medium	Medium	
Land Values	Medium	Medium	
Fish Habitat	Medium	Medium	
Wildlife Habitat	Medium	Medium	
Recreation	Medium	Medium	

## FORMULATION OF ALTERNATIVES

### **Background**

FRS No. 5 has been identified as a high hazard dam because of development within the area that may be flooded by a breach of the dam. Kitty Hawk Road, a major transportation route in the city, is located immediately downstream of the dam.

FRS No. 5 has increased the value of properties located in the surrounding subdivision by creating a water body and open areas for the residents. Properties located around the sediment pool are valued higher than other properties in the area. The sediment pool is used for water-based recreation, primarily fishing. A local bird watching club also frequents the lake to view

migratory birds. FRS No. 5 provides a pleasing environment as well as habitat for fish and waterfowl. FRS No. 5 has also reduced downstream peak discharges and flood depths resulting in reduced flood damages.

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, installation of storm water detention structures and relocation of properties out of the breach area and/or floodplain. These non-structural alternatives were either too cost prohibitive or were not acceptable to the sponsors. Structural measures included planned breach of the dam, decommissioning (removal) of FRS No. 5, adding a larger multi-stage principal spillway, raising the dam, and increasing the capacity of the auxiliary spillway. Also consideration was given to reinforcing the existing auxiliary spillway, and reinforcing (hardening) the embankment with concrete cellular blocks (TRI-LOCK) so that floodwater flowing over the dam would not cause a breach.

Because inhabitable properties are located downstream of FRS No. 5 within the breach inundation area, relocation of properties at-risk was included as an alternative. Ninety-nine residences, 3 businesses, and 4 public entities are within the breach inundation area downstream of the dam. SARA 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.

A 100-year project 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 eligible for financial assistance under the Watershed Protection and Flood Protection Act (PL83-566) as amended by the Watershed Rehabilitation Amendments of 2000. To be eligible for federal assistance, an alternative must meet the requirement as contained in the Watershed Rehabilitation Amendments of 2000.

The "Future Without" or "No Action" alternative serves as a baseline to evaluate the other alternatives. It depicts the most probable future conditions in the absence of a federally assisted project. San Antonio River Authority (SARA) 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" 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 a storm of the Probable Maximum Flood (PMF) would overtop the dam. Appendix C shows the area that will be flooded if the dam breached during passage of a storm of this magnitude.

If the dam fails, Kitty Hawk Road will be overtopped by approximately 7.3 feet and will be severely damaged. Occupants of vehicles on or near the bridge would be endangered. Over 100 inhabitable properties downstream would be at-risk, increasing the threat of loss of life. Approximately 84,000 cubic yards of fill material from the dam breach will be carried downstream and deposited in the stream channels and floodplains. The lake will be lost and land values upstream and around the park adjacent to the sediment pool will be decreased.

Recreational opportunities and fish and wildlife habitat will be lost. If the dam fails San Antonio River Authority (SARA) will then be faced with significant liability for the downstream damages as well as effects to upstream property values. Even though the dam is structurally sound, the state dam safety officer has a high priority interest in upgrading a high hazard dam. SARA considered the following options in deciding the most likely course of action:

- 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.
- Find another sponsor to accept ownership of the dam and the associated risks and responsibilities.
- Breach the dam to eliminate the risk of failure from a catastrophic storm event.

After considering the options, SARA decided that their best option in the absence of federal assistance was to breach the dam and eliminate the risk of the damages from a dam 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.

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

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

This alternative consists of making a breach in the dam of sufficient size to safely pass the 100-year flood event. The breach location will necessitate removal of the principal spillway components. The material (about 84,000 cu yd) will be placed in the present easement area. The remaining exposed area (about 40 acres) will be vegetated for erosion protection. The upstream and downstream channel will be reconnected. No other work will be performed. The City of Live Oak has indicated that, dependent upon funding availability and budgetary priorities, some of the land now covered by the sediment pool could eventually be incorporated into the City Park. This alternative would necessitate Universal City to modify the bridge on Kitty Hawk Road and SARA to stabilize the stream channel. The estimated cost of this option is \$813,000.

**Alternative No. 2 - Decommission FRS No. 5**

This alternative consists of removing the footprint of the dam as much as possible. The principal spillway and the earthen embankment will be removed. Material will be placed in the sediment and detention pools and the auxiliary spillway. All exposed areas will be vegetated as needed for erosion protection (30 acres). Riparian vegetation will be established along the stream (17 acres). Channel work including any needed grade stabilization structures will be installed to reconnect the stream channel through the sediment pool. The City of Live Oak has indicated that, dependent upon funding availability and budgetary priorities, some of the land now covered by the sediment pool could eventually be incorporated into the City Park. This alternative would necessitate Universal City to modify the bridge on Kitty Hawk Road and SARA to stabilize the stream channel. Properties below Kitty Hawk Road are above the 100-year floodplain. Estimated cost is \$1,980,900.

**Alternative No. 3 – Relocation of downstream properties.**

This alternative consists of relocating 106 downstream properties that would be at risk due to a catastrophic breach of FRS No. 5. (See Appendix C, Breach Inundation Map.) Approximately 99 residential, 4 public, and 3 commercial properties will be relocated out of the breach area to other areas of the city. Relocation efforts will follow 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.). This action would necessitate Universal City to modify the bridge on Kitty Hawk Road (estimated cost of \$180,500) so that traffic would not be at risk due to potential dam failure. Estimated cost is \$17,629,700.

**Alternative No. 4 – Rehabilitation of FRS No. 5 by raising the top of dam 3.7 ft and installing a roller compacted concrete curtain in the auxiliary spillway.**

This alternative consists of modifying the structure to meet current performance and safety standards for a high hazard dam. This requires raising the dam's peak elevation by 3.7 feet and installing a roller compacted concrete curtain in the auxiliary spillway to accommodate dam safety criteria. The detention pool area will increase slightly, however all upstream properties would remain above the detention pool easement elevation. Removal of accumulated sediment is not necessary. Upstream property values would be maintained. Estimated cost is \$1,166,600.

**Alternative No. 5 – Rehabilitation of FRS No. 5 by adding an additional 200 ft wide auxiliary spillway and raising top of dam 2.1 ft.**

This alternative consists of modifying the structure to meet current performance and safety standards for a high hazard dam. This requires constructing an additional auxiliary spillway on the east side of the dam, and raising the top of dam by 2.1 feet. The newly constructed auxiliary spillway will provide for additional flow capacity. Removal of accumulated sediment is not necessary. Estimated cost is \$1,937,300.

**Alternative No. 6 – Rehabilitation of FRS No. 5 by installing a roller compacted concrete spillway over top of dam and raising top of dam 2.5 ft.**

This alternative consists of modifying the structure to meet current performance and safety standards for a high hazard dam. This requires adding sufficient additional auxiliary spillway capacity by installing a roller compacted concrete auxiliary spillway over the top of the earthen embankment to pass the flow from the Probable Maximum Flood. In addition the effective height of the top of the dam will be raised 2.5 feet. Removal of accumulated sediment is not necessary. Estimated cost is \$1,594,100.

## EFFECTS OF ALTERNATIVES

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

### **Dam Safety**

- Present Conditions – Although the dam is structurally safe, there is a threat of failure from overtopping. 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 Kitty Hawk Road with approximately 7.3 feet of water at a maximum velocity of 6 feet per second. There are 99 residences, 3 businesses, and 4 public entities downstream of the dam that would be at-risk, resulting in 500-600 people being subject to potential loss of life.
- 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. Modification of the bridge on Kitty Hawk Road would remove the threat of loss of life to occupants of vehicles on or near the bridge.
- Alternative No. 2 - The threat of the dam failing would be removed by decommissioning the dam and removing the footprint. This would eliminate any concern for dam safety. Modification of the bridge on Kitty Hawk Road would remove the threat of loss of life to occupants of vehicles on or near the bridge.
- Alternative No. 3 - Relocation of the at risk properties downstream would remove danger to occupants of the structures. Also, modification of the bridge on Kitty Hawk Road would remove the threat of loss of life to occupants of vehicles on or near the bridge.
- Alternatives No. 4 - The threat of the dam failing would be removed by raising the effective height of the dam thereby reducing the threat of a catastrophic breach from over topping.
- Alternative No. 5 - The threat of the dam failing would be removed by adding an additional auxiliary spillway to the dam thereby reducing the threat of a catastrophic breach from over topping.
- Alternative No. 6 - The threat of the dam failing would be removed by adding an additional auxiliary spillway to the dam thereby reducing the threat of a catastrophic breach from over topping.

### **Human Health & Safety**

- Present Conditions –Threat to human life and safety from dam failure exists. Kitty Hawk Road would be overtopped by approximately 7.3 feet if the dam breached, endangering occupants of vehicles on or near the bridge. There are 99 residences, 3 businesses and 4 public entities downstream of the dam that would be at-risk, resulting in 500-600 people being subject to potential loss of life.

- Alternative No. 1 - No threat from failure. Because of past channelization work immediately below Kitty Hawk Road, downstream structural properties would not be affected if flood protection were removed. Properties below Kitty Hawk Road are above the 100-year floodplain. However minor yard and street flooding would occur.
- Alternative No. 2 - Same as Alternative No. 1.
- Alternative No. 3 - Potential threat from loss of life removed.
- Alternative No. 4 - Threat to human life and safety from a dam failure or flooding removed.
- Alternative No. 5 - Threat to human life and safety from a dam failure or flooding removed.
- Alternative No. 6 - Threat to human life and safety from a dam failure or flooding removed.

### **Flood Damages**

- Present Conditions – The current dam provides only protection from events up to and including the 1% chance storm. Criteria for high hazard class indicates significant flood damages from potential breach of dam. In the event of dam failure, flooding would cause damages to property and infrastructure located downstream from the dam. Estimated damages from a breach of FRS No. 5 would exceed \$8.5 million.
- Alternative No. 1 - Because of past channelization work immediately below Kitty Hawk Road, downstream structural properties would not be affected if flood protection were removed. Properties below Kitty Hawk Road are above the 100-year floodplain. However, minor yard and street flooding would occur. In the absence of the dam, City officials indicated that the bridge on Kitty Hawk road would be modified in order to alleviate flood damages to the roadway and consequential effects to traffic.
- Alternative No. 2 - Same as Alternative No. 1
- Alternative No. 3 - Flood damage potential removed.
- Alternative No. 4 - Downstream threat of flooding removed. Threat of a catastrophic breach is diminished. Universal City would not incur costs of modifying the bridge on Kitty Hawk Road.
- Alternative No. 5 - Flood damage potential removed. Threat of a catastrophic breach is diminished. Universal City would not incur costs of modifying the bridge on Kitty Hawk Road.
- Alternative No. 6 - Flood damage potential removed. Threat of a catastrophic breach is diminished. Universal City would not incur costs of modifying the bridge on Kitty Hawk Road.

### **Threatened and Endangered Species**

- Present Conditions - The affected habitat is not conducive for the black-capped vireo and golden checked warbler. Current habitat is open city parkland with willow (*Salix interior*) and green ash as the predominate woody species along the shore line of inundated areas. Listed T&E avian species habitats can be described as mature ash juniper and motts of scrub oaks species. Consultation with USFWS indicated that no known sighting or nests have been identified in the immediate area. The project area is

also located in Karst Zone 4. A visual reconnaissance of the areas to be impacted revealed no karst habitat, or karst dwelling species.

- Alternative No. 1 - No Effect.
- Alternative No. 2 - No Effect.
- Alternative No. 3 - No Effect.
- Alternative No. 4 - No Effect.
- Alternative No. 5 - No Effect.
- Alternative No. 6 - No Effect.

### **Cultural 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 modification of bridge and channel stabilization measures.
- 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 modification of bridge and channel stabilization measures.
- Alternative 3 - There would be potential to affect cultural resources (should any be present) in areas where earth fill from dam is placed, in areas of modification of bridge and channel stabilization measures, and in areas where structures would be removed from the breach area.
- Alternative 4 - NRCS has conducted a cultural resources survey of the proposed rehabilitation work areas and no known cultural resources will be affected by this alternative.
- Alternative 5 - NRCS has conducted a cultural resources survey of the proposed rehabilitation work areas and no known cultural resources will be affected by this alternative.
- Alternative 6 - NRCS has conducted a cultural resources survey of the proposed rehabilitation work areas and no known cultural resources will be affected by this alternative.

### **Wetlands**

- Present Conditions – FRS No. 5 provides about 33 acres of open water (Lacustrine system) habitat that was created by the construction of the site. Emergent and submerged vegetation occurs on and along shorelines in shallow water areas. Aquatic vegetation is limited due to turbidity and emergent shoreline vegetation is controlled to keep shorelines open for aesthetic reasons. This created wetland provides habitat for reptiles and amphibians, waterfowl, and wading birds. Stream channels above and below the site are narrow and limited to flow only during periods of moderate to heavy rainfall. There are no wetlands located below the dam in the project area.
- Alternative No. 1 - Deep and shallow water wetland habitats will be adversely impacted from the removal of a sufficient water resource that currently supports aquatic dependent species.

- Alternative No. 2 - Deep and shallow water wetland habitats will be adversely impacted from the removal of a sufficient water resource that currently supports aquatic dependent species.
- Alternative No. 3 - This alternative will have no impacts on the deep and shallow water habitats associated with the project area.
- Alternative No. 4 - This alternative will have no impacts on the deep and shallow water habitats associated with the project area.
- Alternative No. 5 - This alternative will have no impacts on the deep and shallow water habitats associated with the project area.
- Alternative No. 6 - This alternative will have no impacts on the deep and shallow water habitats associated with the project area.

### **Air Quality**

- Present Conditions - No air quality problems have been specifically identified and impacts will be of a temporary nature associated with earthmoving and other construction activities.
- Alternative No. 1 - Change only during construction activities and until re-vegetated.
- Alternative No. 2 - Same as Alternative No. 1.
- Alternative No. 3 - No Impact.
- Alternative No. 4 - Same as Alternative No. 1.
- Alternative No. 5 - Same as Alternative No. 1.
- Alternative No. 6 - Same as Alternative No. 1.

### **Water Quality**

- Present Conditions - No water quality problems have been specifically identified and impacts will be of a temporary nature associated with earthmoving and other construction activities.
- Alternative No. 1 - Sediment in stream flow will be carried downstream.
- Alternative No. 2 - Same as Alternative No. 1.
- Alternative No. 3 - About 142 acre-feet of sediment will be trapped in the sediment pool during the project life.
- Alternative No. 4 - About 142 acre-feet of sediment will be trapped in the sediment pool during the project life.
- Alternative No. 5 - About 142 acre-feet of sediment will be trapped in the sediment pool during the project life.
- Alternative No. 6 - About 142 acre-feet of sediment will be trapped in the sediment pool during the project life.

### **Water Quantity**

- Present Conditions - No water quantity problems have been specifically identified and impacts will be of a temporary nature associated with earthmoving and other construction activities.
- Alternative No. 1 - Flow will move downstream adding to volume and peaks as it moves.
- Alternative No. 2 - Same as Alternative No. 1.

- Alternative No. 3 - No change except for reduction in sediment pool volume with time.
- Alternative No. 4 - No change except for reduction in sediment pool volume with time.
- Alternative No. 5 - No change except for reduction in sediment pool volume with time.
- Alternative No. 6 - No change except for reduction in sediment pool volume with time.

### **Aesthetics**

- Present Conditions – The presence of a 33-acre impoundment and its associated open space devoted to the dam, spillway, and flowage areas provide a desirable natural area in an urban setting. FRS No. 5 is an integral part of Live Oak's City Park, which is adjacent to FRS No. 5. The sediment pool has become a focal point of the Park for fishing, scenic views, migratory bird watching, wildlife viewing, and tranquil walks around the lake. The dam and lake also serve as an amenity to the entire park system to plan with and around. The increased value of properties, adjacent to the City Park and upstream of the lake, indicates that many people find the site to be aesthetically desirable. The plant community associated with the site consists of a diverse mixture of trees, shrubs, grasses and forbs. This plant community in association with the water area attracts birds and other wildlife species, which are viewed by area residents. The dam and auxiliary spillway areas are mowed and maintained by San Antonio River Authority to provide a clean and attractive environment. Landowners have indicated they wish to retain the natural beauty of the area and desire that any modifications be the minimal possible, which will provide for the future safety of the structure.
- Alternative No. 1 - Breaching the dam would result in the loss of the 33-acre lake and its associated wetlands. The aesthetic value of the site would be reduced. Most residents would consider it unattractive to leave a major portion of the dam. The City of Live Oak has indicated that, dependent upon funding availability and budgetary priorities, some of the land under the sediment pool could eventually be incorporated into the City Park.
- Alternative No. 2 - Removes the 33-acre lake and its associated wetlands. The dam, auxiliary spillway, and pool areas would be restructured to reflect the pre-project condition and reestablished to native adapted species. The plant community would mature in time and provide habitat for birds and other species. Aesthetic values associated with the lake and associated wetlands would be reduced. The City of Live Oak has indicated that, dependent upon funding availability and budgetary priorities, some of the land under the sediment pool could eventually be incorporated into the City Park.
- Alternative No. 3 - Same as Present Condition except the area of relocation of downstream properties could be turned into a greenbelt area or park.
- Alternative No. 4 - Same as Present Conditions.
- Alternative No. 5 - Same as Present Conditions.
- Alternative No. 6 - Same as Present Conditions.

### **Sedimentation**

- Present Conditions – Sedimentation of the reservoir was surveyed and 142 acre feet remain. At the current sediment rate this will permit an additional 114 years of sediment storage. The sediment contained in the sediment and detention areas of the structure was not tested as it will not be disturbed during construction.

- Alternative No. 1 - Current sediment will remain in area with re-vegetation. Stream borne sediment will travel downstream.
- Alternative No. 2 - Same as Alternative 1.
- Alternative No. 3 - Sediment volume of the structure will be provided for the next 100 plus years.
- Alternative No. 4 - Sediment volume of the structure will be provided for the next 100 plus years.
- Alternative No. 5 - Sediment volume of the structure will be provided for the next 100 plus years.
- Alternative No. 6 - Sediment volume of the structure will be provided for the next 100 plus years.

### **Land Values**

- Present Conditions - There is a large residential area adjacent to the City Park and upstream of the sediment pool. A local realtor estimated that 84 of the properties within this residential area benefit from their proximity to FRS No.5. Even though properties downstream are located along Salitrillo Creek, the channel below Kitty Hawk Road was widened years ago thus allowing for the development of properties above the floodplain. Therefore, property values within the urban area downstream of FRS No. 5 are not negatively affected.
- Alternative No. 1 - There are 84 residential properties adjacent to the City Park and upstream of FRS No. 5 that would suffer 3-10 percent devaluation, or an average of 5 percent decrease in value. Because urban properties below the dam would not experience flooding above the first floor elevation, downstream property values would not be affected. However, minor yard and street flooding would be expected during large storm events.
- Alternative No. 2 - Same as Alternative No. 1.
- Alternative No. 3 - Properties adjacent to the City Park and upstream of FRS No. 5 would not be affected. Over 100 downstream properties at-risk from a catastrophic breach of FRS No. 5 would be relocated to other areas in the city. The resultant lots within the breach area could be converted to greenbelt or park areas. Due to the prohibitive cost of relocation, no estimate was made regarding the future value of the land once the properties are relocated.
- Alternative No. 4 - Upstream and downstream property values would be maintained.
- Alternative No. 5 - Upstream and downstream property values would be maintained. Additional land rights cost would be incurred to procure land for the additional auxiliary spillway.
- Alternative No. 6 - Upstream and downstream property values would be maintained.

### **Fish and Wildlife Habitat**

- Present Conditions - FRS No. 5 is located within the city limits of Live Oak and Universal City, in Bexar County, Texas. The watershed for this site is heavily urbanized. Landuse adjacent to the site is designated as a city park with heavy usage by surrounding homeowners. University of Texas owns the land to the south of FRS No. 5. The land cover is predominantly poor condition rangeland, low seral plant community infested

with honey mesquite (*Prosopis glandulosa*) and Huisache (*Acacia smallii*). The area directly below the dam is an elm (*Ulmus sp.*), hackberry (*Celtis laevigata*), bois d arc (*Maclura pomifera*), mixed wood, herbaceous under-story, thicket. The area along the northeast bank of the sediment pool is infested with green ash (*Fraxinus americana*). A small white-tailed deer (*Odocoileus virginianus*) population, small mammals, and neotropical songbirds and raptors may inhabit the immediate area. Migratory waterfowl frequent the impoundment during migration. Fisheries include largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*) and various species of sunfish (*Lepomis sp.*). Texas Parks and Wildlife stock the impoundment annually as a site for "KID FISH", an event sponsored by the City of Live Oak.

- Alternative No. 1 - This alternative will cause a slight impact to upland game, due to removal of permanent water. Fisheries and waterfowl habitat will be adversely impacted from the removal of a sufficient water resource, which supports these aquatic dependent species. Additionally, amphibian species will be impacted by the removal of permanent water.
- Alternative No. 2 - This alternative will have minimal or no significant, positive or negative impacts to current upland game species. Fisheries and waterfowl habitat will be adversely impacted from the removal of a sufficient water resource, which supports aquatic dependent species. Additionally, amphibian species will be impacted by the removal of permanent water.
- Alternative No. 3 - This alternative will have no impacts on the fisheries, wildlife and natural resources associated with the project area.
- Alternative No. 4 - This alternative will have no impacts on the fisheries, wildlife and natural resources associated with the project area.
- Alternative No. 5 - This alternative will have no impacts on the fisheries, wildlife and natural resources associated with the project area.
- Alternative No. 6 - This alternative will have no impacts on the fisheries, wildlife and natural resources associated with the project area.

## Recreation

- Present Conditions – The City of Live Oak is responsible for maintenance of the park grounds adjacent to the lake. There are recreation facilities such as picnic tables, pavilions, playgrounds, disc golf, as well as several restrooms. Approximately 15,000 people visit the park each year, of which an estimated 1,350 utilize the sediment pool for fishing, migratory bird watching, and other water-based activities. Several local groups (e.g., boy scouts) utilize the park during the year for campouts. Fishing is a common activity of these groups. The sediment pool is stocked annually for a children's fishing tournament. A local birding club also frequents FRS No. 5 to view migratory birds.
- Alternative No. 1 - Loss of the sediment pool will reduce the value of the recreational experience for residents of Live Oak, Universal City, and other nearby towns. The number of visitor-days will be reduced by about 1,350. Water-based recreation activities will be lost. Presence of migratory birds will diminish. The City of Live Oak has indicated that, dependent upon funding availability and budgetary priorities, some of the land under the sediment pool could eventually be incorporated into the City Park.
- Alternative No. 2 - Same as Alternative No. 1.

- Alternative No. 3 - The recreational experience upstream of the dam will be maintained. Due to the prohibitive cost of relocation, no estimate was made regarding the possibility of converting downstream vacant lots to greenbelt or park areas. There would be no effect on the visitor usage of the Live Oak City Park.
- Alternative No. 4 - The recreational experience will be maintained. There would be no effect on the visitor usage of the Live Oak City Park.
- Alternative No. 5 - The recreational experience will be maintained. There would be no effect on the visitor usage of the Live Oak City Park.
- Alternative No. 6 - The recreational experience will be maintained. There would be no effect on the visitor usage of the Live Oak City Park.

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

**Table B - Concerns Addressed by Alternatives**

Concerns	Present Conditions	Alternative No. 1	Alternative No. 2	Alternative No. 3	Alternative No. 4	Alternative No. 5	Alternative No. 6
Dam Safety	High	Low	Low	Low	Low	Low	Low
Human Health & Safety	High	Medium	Medium	Low	Low	Low	Low
Flood Damages	High	Medium	Medium	Low	Low	Low	Low
T&E Species	High	Low	Low	Low	Low	Low	Low
Cultural Resources	High	Low	Low	Low	Low	Low	Low
Wetlands	High	High	High	Low	Low	Low	Low
Air Quality	Low	Low	Low	Low	Low	Low	Low
Water Quality	Medium	Low	Low	Medium	Medium	Medium	Medium
Water Quantity	High	Low	Low	Medium	Medium	Medium	Medium
Aesthetics	High	High	High	High	High	High	High
Sedimentation	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Land Values	Medium	Medium	Medium	High	High	Low	Low
Fish and Wildlife Habitat	Medium	High	High	Medium	Medium	Medium	Medium
Recreation	Medium	High	High	Medium	Medium	Medium	Medium

## COMPARISON OF ALTERNATIVES

Table C compares each of the alternatives.

		<i>Table C - Comparison of Alternatives</i>				
EFFECTS	Alternative No. 1	Alternative No. 2	Alternative No. 3	Alternative No. 4	Alternative No. 5	Alternative No. 6
<i>Description</i>						
Project Investment	\$813,000	\$1,980,900	\$17,629,700	\$1,166,600	\$1,937,300	\$1,594,100
Annual Costs	\$48,900	\$118,300	\$1,040,200	\$73,800	\$119,200	\$99,000
Annual Benefits	\$0	\$0	\$69,500	\$80,100	\$80,100	\$80,100
Net Monetary Benefits	(\$48,900)	(\$118,300)	(\$970,700)	\$6,300	(\$39,100)	(\$18,900)
Water	Loss of sediment pool (33 acres)	Loss of sediment pool (33 acres)	Maintain sediment pool (33 acres)	Maintain sediment pool (33 acres)	Maintain sediment pool (33 acres)	Maintain sediment pool (33 acres)
Land	Minor erosion during construction. 33 acres of open water (Lacustrine) wetland (current pool of FRS No. 5) converted to open area)	Minor erosion during construction. 33 acres of open water (Lacustrine) wetland (current pool of FRS No. 5) converted to open area)	Minor erosion during relocation of downstream properties.	Minor erosion during construction 17.5 acres disturbed during construction.	Minor erosion during construction 57.5 acres disturbed during construction.	Minor erosion during construction 17.5 acres disturbed during construction.
Air	Minor adverse during construction.	Minor adverse during construction	No Effect	Minor adverse during construction.	Minor adverse during construction.	Minor adverse during construction.
Plants & Animals	Loss of 33 acres of fish and wildlife habitat.	Loss of 33 acres of fish and wildlife habitat.	Fish & wildlife habitat maintained.	Fish & wildlife habitat maintained.	Fish & wildlife habitat maintained.	Fish & wildlife habitat maintained.
Threatened & Endangered Species	No effect	No effect	No Effect	No Effect	No Effect	No effect
Area Economy	Removal of dam will be negative.	Removal of dam will be negative.	Economy maintained & enhanced.	Economy maintained & enhanced.	Economy maintained & enhanced.	Economy maintained & enhanced.
Human Resources	Reduced threat to loss of life.	Reduced threat to loss of life.	Threat to loss of life removed; neighborhood amenities will be negatively affected downstream.	Threat to loss of life removed.	Threat to loss of life removed.	Threat to loss of life removed.
Cultural Resources	No effect	No effect	No effect	No effect	No effect	No effect

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

*Table D Summary of Benefits, Martinez Creek, FRS No. 5<sup>1/</sup>*

Item	Alternative No. 1 No Action (Future Without)		Alternative No. 2 Decommission FRS 5		Alternative No. 3 Relocate at Risk Properties		Alternative No. 4 Rehabilitate FRS 5		Alternative No. 5 Rehabilitate FRS 5		Alternative No. 6 Rehabilitate FRS No. 5	
	Benefits	Change in Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits
Original Downstream Benefits <sup>2/</sup>	\$0	\$0	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700	\$11,700
Property Values (upstream area) <sup>3/</sup>	\$0	\$0	\$20,400	\$20,400	\$0	\$0	\$20,400	\$20,400	\$20,400	\$20,400	\$20,400	\$20,400
Downstream Infrastructure <sup>4/</sup>	\$0	\$0	\$0	\$0	\$0	\$0	\$10,600	\$10,600	\$10,600	\$10,600	\$10,600	\$10,600
Incidental Recreation	\$0	\$0	\$37,400	\$37,400	\$37,400	\$37,400	\$37,400	\$37,400	\$37,400	\$37,400	\$37,400	\$37,400
Flood Damage Reduction	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$0	\$0	\$69,500	\$69,500	\$69,500	\$69,500	\$80,100	\$80,100	\$80,100	\$80,100	\$80,100	\$80,100

<sup>1/</sup> All numbers reflect 2002 prices.

<sup>2/</sup> Updated using applicable indices.

<sup>3/</sup> Reflects avoidance of upstream property values devaluation.

<sup>4/</sup> Reflects avoidance of modification costs for a bridge on Kitty Hawk Road.

<sup>5/</sup> Due to the extremely low probability of a rainfall event capable of breaching the dam, downstream urban flood damage reduction benefits on an average annual basis would be minimal.

## RISK & UNCERTAINTY

The areas of risk and uncertainty associated with this project lie with the accuracy of the cost estimates of each of the alternatives, the reliability of assessment of impacts, and computer models used in evaluation and design. The scoping process was used to determine the procedures to be used and the needed reliability. The computer models used in evaluation and design of the modification of the dam are generally accepted computer models for this type of work. The procedures used in developing the detail and cost estimates for each of the alternatives are considered adequate to compare the alternatives and make an assessment of the impacts. There does not appear to be any area that using different procedures or making more intensive studies would have resulted in a different decision.

## RATIONALE FOR PLAN SELECTION

For water and related land resources implementation studies, standards and procedures have been established in formulating alternative plans. These standards and procedures are found in "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)". According to P&G, an alternative that reasonably maximizes net national economic development benefits is to be formulated. This alternative is to be identified as the national economic development (NED) plan. Alternative No. 4 – Rehabilitation of FRS No. 5 by raising the top of dam 3.7 ft and installing a roller compacted concrete curtain in the auxiliary spillway is the NED plan and will increase the nation's economic output. Annual benefits total \$80,100 and annual cost is estimated at \$73,800, resulting in a net annual benefit of \$6,300. This results in a benefit to cost ratio of 1.09:1.0. The existing dam has already provided significant flood protection downstream, as well as enhanced upstream property values.

Alternative plans, including the NED plan, were formulated in consideration of four criteria or tests: completeness, effectiveness, efficiency, and acceptability. These tests were applied to each of the alternatives. All alternatives meet the tests of completeness. Alternative Nos. 1 and 2 are not effective in addressing the core problem of removing the safety hazard while assuring that the dam will maintain present level of flood control benefits into the future. Alternative Nos. 1 and 2 were not acceptable to the local people because they failed to meet their objectives. Alternative No. 3 was not acceptable to the local people because it would involve the relocation of their families, disrupting neighborhoods and affecting their current way of life. Alternative No. 5 would require additional landrights for project installation, which made it unfavorable to the sponsors. Alternative Nos. 5 and 6 would meet the needs of the sponsors and meet the needs for the performance and safety standards of the structure but were considerably more costly than Alternative No. 4. Alternative No. 4 is the most efficient way to accomplish the desired objectives of removing the safety hazard and assuring continued performance. Alternative No. 4 is the preferred alternative. It meets the purpose and need to maintain the present level of flood control benefits, complies with current performance and safety standards, and assures that the dam will continue to properly function into the future. It also produces the most net monetary benefits, and a sponsor has agreed to underwrite the local share of the costs.

## CONSULTATION & PUBLIC PARTICIPATION

At the beginning of this study, the appropriate state and local agencies were informed of the effort and invited to offer input. Several coordination meetings were held with the San Antonio River Authority, Alamo Soil and Water Conservation Board and dam safety representatives of Texas Commission on Environmental Quality. A public meeting was held at the City of Live Oak on October 21, 2002 informing the public of the initiation of planning and requesting oral and written input. The notice of the meeting was posted and published in the local newspaper. Representatives of U.S. Fish & Wildlife Service and Texas Commission on Environmental Quality participated in a field review of the proposal on February 26, 2003. The U.S. Army Corps of Engineers, Environmental Protection Agency and Texas Parks and Wildlife Department were also invited but did not send a representative. The U.S. Army Corps of Engineers made a field visit to the site on April 3, 2003. A steering committee made up of representatives of the Sponsors, city officials from the City of Live Oak and Universal City, local homeowners and other interested citizens was organized. Input received from the group was used to scope items of concern in developing the environmental assessment and the development and evaluation of alternatives.

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

Governor - State of Texas  
Texas Office of State-Federal Relations (State Single Point of Contact)  
Texas State Soil and Water Conservation Board  
Texas Commission on Environmental Quality  
Texas Parks & Wildlife Department  
Texas Water Development Board  
Texas Agricultural Experiment Station  
Texas Historical Commission  
US Army Corps of Engineers, Ft. Worth District  
USDI-Bureau of Reclamation  
U.S. Environmental Protection Agency  
U.S. Fish and Wildlife Service  
USDA-Forest Service  
City of Live Oak, Texas  
City of Converse, Texas  
City of Universal City, Texas  
Bexar County Commissioners Court  
Alamo Soil and Water Conservation District  
University of Texas  
Local Steering Committee members

**Discussion and Disposition of comments from letters received on the Draft Supplemental Watershed Plan/Environmental Assessment (Plan/EA).**

Not all agencies and groups requested to comment on the Plan/EA submitted comments. The following responding agencies and groups' comments (See Appendix A for letters) and disposition are as follows:

**Leslye F. Baumann, Mayor Pro-Tem, City of Live Oak**

Comment: In reviewing the June 2003 Draft Supplement Watershed Plan No. 1 and Environmental Assessment for FRS No. 5, it appears that the concerns of the Citizens Steering Committee and the homeowners of the effected upstream properties have been addressed. It is my understanding that Alternative 4 has been selected to modify the dam and in the process of implementing Alternative 4 the elevations of the upstream properties will be raised above the level of the detention pool easement elevations. In the first draft presented to the Steering Committee April 28, 2003, Alternative 4 called for the obtainment of the easements in backyards of upstream properties. The obtainment of these easements was not acceptable to the committee or the homeowners. In addition, this would have been far more expensive to implement than was estimated in the first draft.

I agree with the dam rehabilitation by Alternative 4 only if the plan is to raise elevation of upstream properties above the retention pool easement level.

Response: Alternative 4 is the preferred alternative and the San Antonio River Authority will raise any effected upstream properties above the level of the detention pool easement elevations.

**Texas Water Resources Institute**

Comment: On behalf of the Texas Agricultural Experiment Station and Director Ed Hiler, I have reviewed NRCS Draft Plan Supplement and Environmental -Assessment for the proposed rehabilitation of Floodwater Retarding Structure No. 5 in Bexar County.

I have reviewed the plan and have no comments or concerns regarding the analysis 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.

Response: Noted.

**Texas Water Development Board**

Comment: Texas Water Development Board (TWDB) technical staff has reviewed the Draft Plan Supplement and Environmental Assessment for the proposed rehabilitation of Floodwater Retarding Structure No. 5, which would provide additional safety and compliance with current performance of flood control. Based on the urbanization of

the area since the structure was first approved for operation in 1959, there appears to be a significant need to ensure greater protection to downstream life, properties, and infrastructure. The proposed project would minimize the risk of dam-failure and assure that the flood control structure will continue to function safely in the future. These are all goals that the TWDB concurs are important.

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

Response: Noted.

**Texas State Soil and Water Conservation Board**

Comment: We have reviewed the Draft Plan Supplement and Environmental Assessment on the proposed rehabilitation of Floodwater Retarding Structure No. 5 of the Martinez Creek Watershed, Bexar 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.

Response: Noted.

## **RECOMMENDED PLAN**

Alternative No. 4 is the preferred alternative. The dam will be modified to meet current performance and safety standards for a high hazard dam. The modification will consist of raising top of dam 3.7 ft and installing a roller compacted concrete (RCC) curtain in the auxiliary spillway. The RCC spillway curtain will be constructed near the upstream level section of the auxiliary spillway. A splitter dike will also be installed in the existing auxiliary spillway to decrease the bay width. Construction activities will result in the disturbance of approximately 17.5 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 footprint of the existing dam will be increased slightly by the addition of this cap. The back slope of the dam will be flattened to a 3:1 slope.

## **COMPLIANCE WITH LOCAL, STATE, AND FEDERAL LAWS**

All applicable local, state, and federal laws will be complied with in the installation of this project. Construction activities will require a Storm Water Pollution Prevention Plan (SWPPP). The Corps of Engineers has indicated that the project will require authorization under Section 404 of the Clean Water Act, and that the project likely falls 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 Alternatives 4, 5, and 6 and no known sites are recorded in the vicinity.

Ensuing disturbances associated with rehabilitation measures will be monitored for the presence of undiscovered sites. In the event of such discovery, appropriate actions will be taken in accordance with the State Level Agreement among NRCS and the Texas State Historic Preservation Officer, the National Programmatic Agreement 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 sponsoring local organizations. San Antonio River Authority has the prime responsibilities for maintenance of FRS No. 5. A new Operation and Maintenance (O&M) Agreement will be developed with the San Antonio River Authority and the Alamo Soil and Water Conservation District for FRS No. 5 for the 100 year evaluated life of the structure. Operation and Maintenance (O&M) activities include but are not limited to inspections, maintenance and repairs of the principal spillways, dam, vegetation and the auxiliary spillway. It is estimated that O&M activities will amount to about \$5,000 per year.

## FINANCING ARRANGEMENTS

The installation of the project will be financed jointly by the San Antonio River Authority, Bexar County, and the NRCS. NRCS will use funds appropriated for this purpose. The percentages of the eligible installation costs including construction, engineering, project administration, and land rights to be paid by the Sponsoring Local Organization and the NRCS are as follows:

	<u>Sponsors</u>	<u>NRCS</u>	<u>Estimated Installation Cost</u>
Rehabilitation of FRS No. 5	35 %	65 %	\$1,166,600

An amount up to the percentage rate specified may be satisfied by the Sponsoring Local Organization for cost of an element such as engineering, real property acquisition 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 (\$241,800) 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 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 Organization and are not counted toward local cost share. See Table 2 in Appendix E for a complete distribution of total rehabilitation costs.

**LIST OF PREPARERS**

Name & Present Title	Education	Experience (Years)
Steve Graham, P.E, Director Watershed Management, San Antonio River Authority	B.S. Civil Engineering	
Jim Blair, Flood Control Infrastructure Manager, San Antonio River Authority	B.S. Forestry	
Fernando Garza, District Conservationist, NRCS	B.S.	
James Neighbors, Resource Conservationist, NRCS	M.S. Range Management	35
James Featherston, Agricultural Economist, NRCS	M.S. Agricultural Economics	26
Dave Petefish, Geologist, NRCS	M.S. Geology	30
Calvin Sanders, Cultural Resources Specialist, NRCS	M.A. Anthropology	22
Ronnie Skala, P. E. Hydraulic Engineer, NRCS	B.S. Agricultural Engineering	24
Russell Castro, Wildlife Biologist, NRCS	B.S. Wildlife Management	23
David Strakos, Civil Engineering Technician – NRCS	High School Diploma	25

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

## REFERENCES

1. Bernard, J., L. Steffen, T. Iivary, and F. Reckendorf. 1995. *Reservoir Sediment Survey Information System (RESIS): Reservoir Descriptions, Sediment Deposition Rates, and Location Correlation with the National Inventory of Dams for the NRCS South Central Region*. USDA, NRCS, Washington, D.C.
2. Bureau of Economic Geology. 1983. *Geologic Atlas of Texas: San Antonio Sheet*. Bureau of Economic Geology, Austin, Texas.
3. Texas Archeological Sites Atlas. USGS Shertz, Texas Quad.
4. USDA Soil Conservation Service. August 1959. *Work Plan, Martinez Creek Watershed*.

## **APPENDIXES**

- APPENDIX A: Comment Letters Received on the Draft Supplemental Plan/Environmental Assessment
- APPENDIX B: Vicinity Map
- APPENDIX C: Breach Inundation Map
- APPENDIX D: Project Map
- APPENDIX E: Table 1 – ESTIMATED INSTALLATION COST
- Table 2 – ESTIMATED COST DISTRIBUTION – STRUCTURAL AND NONSTRUCTURAL MEASURES
- Table 3 – STRUCTURAL DATA–FRS No. 5 DAM WITH PLANNED STORAGE CAPACITY
- Table 4 – ANNUAL COSTS
- Table 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE BENEFITS
- Table 6 – COMPARSION OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

**APPENDIX A**

Comment Letters Received on the Draft Supplemental Plan/Environmental Assessment



# City of Live Oak

8001 Shin Oak Drive · Live Oak, Texas 78233-2497 · (210) 653-9140 · Fax: (210) 653-2766 · [www.ci.live-oak.tx.us](http://www.ci.live-oak.tx.us)

July 17, 2003

**FILE COPY**  
*Bade*

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

Dear Dr. Butler,

In reviewing the June 2003 Draft Supplement Watershed Plan No. 1 and Environmental Assessment for FRS No. 5, it appears that the concerns of the Citizens Steering Committee and the homeowners of the effected upstream properties have been addressed. It is my understanding that Alternative 4 has been selected to modify the dam and in the process of implementing Alternative 4 the elevations of the upstream properties will be raised above the level of the detention pool easement elevation. In the first draft presented to the Steering Committee April 28, 2003, Alternative 4 called for the obtainment of the easements in backyards of upstream properties. The obtainment of these easements was not acceptable to the committee or the homeowners. In addition, this would have been far more expensive to implement than was estimated in the first draft.

I agree with the dam rehabilitation by Alternative 4 only if the plan is to raise elevation of upstream properties above the retention pool easement level.

Respectfully,

  
Leslye F. Baumann  
Mayor Pro-Tem



# TEXAS WATER DEVELOPMENT BOARD



E. G. Rod Pittman, *Chairman*  
Wales H. Madden, Jr., *Member*  
Thomas Weir Labatt III, *Member*

J. Kevin Ward  
*Executive Administrator*

Jack Hunt, *Vice Chairman*  
William W. Meadows, *Member*  
Dario Vidal Guerra, Jr., *Member*

FILE COPY  
Bude

July 14, 2003

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

Re: Draft Supplemental Watershed Plan No. 1 & Environmental Assessment  
Rehabilitation of Floodwater Retarding Structure for Martinez Creek Watershed

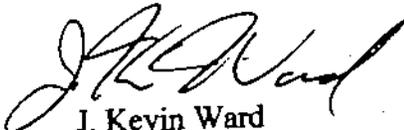
Dear Dr. Butler:

Texas Water Development Board (TWDB) technical staff has reviewed the Draft Plan Supplement and Environmental Assessment for the proposed rehabilitation of Floodwater Retarding Structure No. 5, which would provide additional safety and compliance with current performance of flood control. Based on the urbanization of the area since the structure was first approved for operation in 1959, there appears to be a significant need to ensure greater protection to downstream life, properties, and infrastructure. The proposed project would minimize the risk of dam failure and assure that the flood control structure will continue to function safely in the future. These are all goals that the TWDB concurs are important.

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

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

Sincerely,

  
J. Kevin Ward  
Executive Administrator

*Our Mission*

*Provide leadership, technical services and financial assistance to support planning, conservation, and responsible development of water for Texas.*

P.O. Box 13231 • 1700 N. Congress Avenue • Austin, Texas 78711-3231

Telephone (512) 463-7847 • Fax (512) 475-2053

1-800-RELAYTX (for the hearing impaired)

URL Address: <http://www.twdb.state.tx.us>

E-Mail Address: [info@twdb.state.tx.us](mailto:info@twdb.state.tx.us)

TNRIS - The Texas Information Gateway • [www.tnr.is.state.tx.us](http://www.tnr.is.state.tx.us)  
A Member of the Texas Geographic Information Council (TGIC)



JUL 22 2003



# Texas Water Resources Institute

THE AGRICULTURE PROGRAM

1500 Research Parkway, Suite 240

2118 TAMU

College Station, TX 77843-2118

Phone: 979.845.1851 Fax: 979.845.8554 Web: <http://twri.tamu.edu>

FILE COPY

*Bude  
Son*

July 11, 2003

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

Dear Dr. Butler:

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

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

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

Sincerely,

C. Allan Jones

Director,

Texas Water Resources Institute  
Assistant Vice Chancellor,

Agriculture and Life Sciences

Associate Director,

Texas Agricultural Experiment Station

CAJ/rp



# Texas State Soil & Water Conservation Board

3 Jul 03

FILE COPY

*Bode*

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

Re: FRS 5 Martinez Creek Watershed

Dear Mr. Butler:

We have reviewed the Draft Plan Supplement and Environmental Assessment on the proposed rehabilitation of Floodwater Retarding Structure No. 5 of the Martinez Creek Watershed, Bexar 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*

Richard Egg, P.E.  
Engineer

JUL 07 2003



**APPENDIX C**  
**Breach Inundation Map**



**APPENDIX E**

**TABLE 1 - ESTIMATED INSTALLATION COST**  
**FRS No. 5**  
**Martinez Creek Watershed, Texas**  
**(Dollars)<sup>1/</sup>**

Installation Cost Item	Unit	Number	Estimated Costs <sup>2/</sup>		
			Federal Funds	Other Funds	Total
Rehabilitation of FRS No. 5	No.	1	\$842,900	\$323,700	\$1,166,600
<b>Total Project</b>			\$842,900	\$323,700	\$1,166,600

<sup>1/</sup> 2002 Prices.

<sup>2/</sup> Federal Funds include NRCS Technical Assistance (\$241,800), which is not included when calculating eligible federal cost share. Therefore, federal cost share is based on Estimated Project Cost of \$924,800.

**APPENDIX E**

**TABLE 2 – ESTIMATED COST DISTRIBUTION - STRUCTURAL AND NON-STRUCTURAL MEASURES**

**FRS No. 5**

Martinez Creek Watershed, Texas  
(Dollars) <sup>1/</sup>

	Installation Cost Federal Funds <sup>2/</sup>				Installation Costs – Other Funds					
	Construction	Engineering Services	Project Administration	Total Federal Funds	Construction	Engineering Services	Land Rights	Project Administration	Total Other Funds	Total All Funds
Rehabilitation of FRS No. 5	\$601,100	\$117,000	\$124,800	\$842,900	\$178,700	\$30,000	\$95,000	\$20,000	\$323,700	\$1,166,600
<b>TOTAL</b>	<b>\$601,100</b>	<b>\$117,000</b>	<b>\$124,800</b>	<b>\$842,900</b>	<b>\$178,700</b>	<b>\$30,000</b>	<b>\$95,000</b>	<b>\$20,000</b>	<b>\$323,700</b>	<b>\$1,166,600</b>

<sup>1/</sup> 2002 Prices.

<sup>2/</sup> Federal Engineering Services and Project Administration costs are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Estimated Project Cost of \$924,800.

**APPENDIX E**  
**REVISED TABLE 3, STRUCTURAL DATA**  
**Martinez Creek Watershed, Texas**

Item	Unit	FRS No. 5
Class of structure		high
Seismic zone		0
Uncontrolled drainage area	mi <sup>2</sup>	2.86
Runoff Curve Number (1-day) (Avg. AMC)		75
Time of concentration (T <sub>c</sub> )	hrs	0.89
Elevation top of dam	ft	799.6
Elevation crest of emergency spillway	ft	792.1
Elevation crest principal spillway	ft	778.1
Maximum height of dam	ft	42
Volume of fill	yd <sup>3</sup>	255,900
Total capacity (emergency spillway crest)	ac-ft	1020
Lowest ungated outlet	ac-ft	110
Sediment Pool	ac-ft	130
Floodwater retarding Pool	ac-ft	890
Surface area		
Sediment pool	acres	30
Floodwater retarding pool	acres	91
Principal spillway		
Rainfall volume (1-day)	in	9.9
Rainfall volume (10-day)	in	16.0
Runoff volume (10-day)	in	10.75
Type		concrete
Diameter	in	30
Capacity	ft <sup>3</sup> /s	122
Emergency spillway		
Vegetated with concrete barrier wall		
Bottom width	ft	250
Exit slope	%	8.7
Frequency of operation	% chance	1.0
Emergency spillway hydrograph		
Rainfall volume	in	13.2
Runoff volume	in	9.90
Storm duration	hrs	6
Velocity of flow (V <sub>c</sub> )	ft/s	8.2
Maximum reservoir water surface elevation	ft	794.5
Freeboard hydrograph		
Rainfall volume	in	30.5
Runoff volume	in	26.84
Storm duration	hrs	6
Maximum reservoir water surface elevation	ft	799.6
Discharge per ft of width (O <sub>c</sub> /b)	ac-ft	12.2
Storage capacity equivalents		
Sediment volume	in	0.85
Floodwater retarding volume	in	5.83

Sediment storage remaining 114 (years) based on predicted sediment rate of 0.4 ac.ft year/sq mi DA (2.86), with 130 ac ft of sediment storage remaining at elevation 778.1.

**APPENDIX E**

**TABLE 4 - ANNUAL COSTS  
FRS No. 5  
Martinez Creek Watershed, Texas  
(Dollars) <sup>1/</sup>**

Evaluation Unit	----- Project Outlays -----		Total
	Amortization of Rehabilitation Cost <sup>2/</sup>	Operation, Maintenance and Replacement Cost	
FRS No. 5	\$68,800	\$5,000	\$73,800
Grand Total	\$68,800	\$5,000	\$73,800

<sup>1/</sup> Price base 2002

<sup>2/</sup> Amortized for 100 years at 5.875 percent

## APPENDIX E

**Table 5 - Estimated Average Annual Flood  
Damage Reduction Benefits  
Martinez Creek Watershed, Texas  
(Dollars) <sup>1/</sup>**

Item	Estimated Average Annual Benefits <sup>2/</sup>
Floodwater	\$3,300
Crop and Pasture	\$2,700
Other Agricultural	\$5,100
Nonagricultural (Road and Bridge)	\$11,100
Subtotal	
Sediment	\$100
Overbank Deposition	
Erosion	\$500
Flood Plain Scour	
<b>TOTAL</b>	<b>\$11,700</b>

<sup>1/</sup> Price Base: 2002 prices.

<sup>2/</sup> Original downstream benefits updated using applicable indices.

APPENDIX E

**Table 6 - Comparison of Benefits and Costs for Structural Measures  
Martinez 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>	Avoidance of Upstream Property Values Devaluation	Avoidance of Loss of Incidental Recreation	Avoidance of Modifications to Downstream Infrastructure		
Rehabilitation of Floodwater Retarding Structure No. 5	\$11,700	\$20,400	\$37,400	\$10,600	\$80,100	1.09:1.0

<sup>1/</sup> Price Base: 2002 prices.

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

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