



United States
Department
Of Agriculture

Natural
Resources
Conservation
Service

**SUPPLEMENTAL
WATERSHED PLAN No. 3 &
ENVIRONMENTAL ASSESSMENT**

**For
Rehabilitation of Floodwater Retarding
Structure No. 6A
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 2006

FINAL
Supplemental Watershed Plan No. 3 & Environmental Assessment
For
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AUTHORITY

The original watershed work plan was prepared, and works of improvement have been installed, under the authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566) as amended. The rehabilitation of floodwater retarding structure No. 6A is authorized under Public Law 83-566 (as amended), and as further amended by Section 313 of Public Law 106-472

ABSTRACT

Historical floods in the past forty years have caused the auxiliary spillways of Floodwater Retarding Structure No. 6A to function numerous times with up to 2.5 feet of flow during a 1998 storm event. Urban development and expansion of major highway systems downstream of the dam have caused concerns regarding the hydraulic capacity of the dam and human health and safety. As a result, the dam has been reclassified as a high hazard class (c) dam which fails to comply with current dam safety and performance criteria. Local project sponsors have chosen to rehabilitate the dam to address the identified safety deficiencies. The purposes of the proposed rehabilitation of floodwater retarding structure No. 6A are to maintain present level of flood control benefits, comply with current performance and safety standards, and extend the service life of the structure. Rehabilitation of the site will require the following modifications to the structure: raise the top of the dam 3.1 feet, install an additional principal spillway, and widen the auxiliary spillways to accommodate splitter dikes. Project installation cost is estimated to be \$1,627,100, of which \$1,151,500 will be paid from the Small Watershed Rehabilitation funds and \$475,600 from local funds.

COMMENTS AND INQUIRIES

Comments and inquires must be received by June 19, 2006. Submit comments and inquires to:
Steven Bednarz, Assistant State Conservationist, Water Resources, USDA/NRCS, 101 South Main, Temple, Texas 76501 (254-742-9871).

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SUPPLEMENTAL WATERSHED AGREEMENT NUMBER 3

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(s) named therein and the Service, became effective on the 7th day of August, 1959; and

Whereas, the Supplemental Watershed Work Plan Agreement for Martinez Creek Watershed, State of Texas, executed by the Sponsoring Local Organizations (SLO) named therein and the Service, became effective on the 5th day of September 2003; and

Whereas, the Supplemental Watershed Work Plan Agreement No. 2 for Martinez Creek Watershed, State of Texas, executed by the Sponsoring Local Organizations (SLO) named therein and the Service, became effective on the 13th day of April 2005; 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. 6A beyond its evaluated life, it has become necessary to modify said watershed agreement; and

Whereas, the rehabilitation of said FRS No.6A has been authorized under the authority of the Watershed Protection and Flood Protection Act (PL 83-566) as amended by the Watershed Rehabilitation Amendments (PL 106-472) provides the authority for rehabilitation; and

Whereas, it has become necessary to modify said watershed work plan by modifying Floodwater Retarding Structure (FRS) No. 6A to bring it up to current performance and safety standards and to extend the service life of the dam for an additional 100 years; and

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

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

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

(1) Paragraph No. 26 is added to the plan agreement with respect to the Rehabilitation of Floodwater Retarding Structure (FRS) No. 6A:

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

<u>Rehabilitation of</u>	<u>Sponsoring Local Organizations</u>	<u>Service</u>	<u>Total Eligible Project Cost</u>
FRS No.6A	35 %	65 %	\$1,358,900

The Service is responsible for the engineering services and project administration costs (\$268,200) it incurs. However, these costs are not used in the calculation of the federal cost share. Therefore, they are not included in Total Eligible Project Cost above. Also, costs of water, mineral and other resource rights, as well as federal, state and local permits are the responsibility of the Sponsoring Local Organizations and are not counted toward local cost share.

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

(2) Paragraph No. 27 is added to the Plan Agreement as follows:

The Sponsoring Local Organizations will be responsible for the operation and maintenance (O&M) and replacement of parts or portions of rehabilitated FRS No. 6A that have a service life of less duration than the program life of the structure. Specifically, the San Antonio River Authority (SARA) will be responsible for the maintenance of FRS No. 6A. Also, SARA will be responsible for routine mowing, fence, gates and road maintenance, and overseeing any needed replacement of the works of improvement following completion of construction by actually performing or arranging for such work, in accordance with agreements to be entered into before issuing invitations to bid for construction work. SARA and the Alamo Soil and Water Conservation District will jointly be responsible for the operation of the structure. Although the Sponsoring Local Organizations' O&M responsibility extends past 100 years, the term of this O&M agreement will be for a period of 100 years, which is the program life of the rehabilitated structure, and does not commit the Service to assistance of any kind beyond that point unless agreed to by all parties.

(3) Paragraph No. 28 is added to the Plan Agreement as follows:

The Sponsoring Local Organizations agree to develop an Emergency Action Plan (EAP) before

any rehabilitation construction activities begin stating the responsibilities for the development, implementation and review of actions necessary to provide safety to individuals downstream of FRS No. 6A should extreme flooding occur.

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

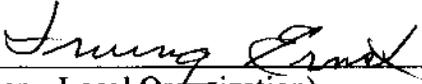
Alamo Soil and Water Conservation District
Local Organization

By 

Title Chairman

Date July 11, 2006

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 7-11-06.


(Secretary, Local Organization)

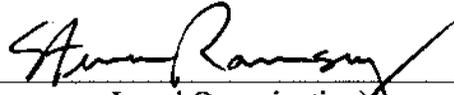
San Antonio River Authority
Local Organization

By 

Title General Manager

Date July 20, 2006

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 October 2003.


(Asst Secretary, Local Organization)

Natural Resources Conservation Service
United States Department of Agriculture

Approved By 
NRCS State Conservationist

Date JUL 27 2006

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SUPPLEMENTAL WATERSHED PLAN NO. 3 & ENVIRONMENTAL ASSESSMENT

SUMMARY OF SUPPLEMENTAL PLAN/ENVIRONMENTAL ASSESSMENT

Project Name: Rehabilitation of Floodwater Retarding Structure (FRS) No. 6A, Martinez Creek Watershed, Bexar County, Texas

Sponsoring Local Organizations (Sponsors): Alamo Soil and Water Conservation District (Alamo SWCD) and the San Antonio River Authority (SARA)

Description of Recommended Plan: This alternative consists of leaving the existing drop inlet type principal spillway and connecting 42" pipe intact and adding a 36" diameter hooded inlet type principal spillway with an impact basin. The release channels of the two principal spillways will be connected. The crest elevation of both existing auxiliary spillways will remain unchanged; however the existing auxiliary spillways will be widened 50 feet to accommodate the construction of splitter dikes. The top of the dam would be raised by 3.1 feet to elevation 634.2. The evaluated life of the structure will be extended for an additional 100 years.

Resource Information:

Size of planning area: 8,245 acres

Land Cover	Acres	Percent
Cropland	3,162	38.4
Grassland	3,028	36.7
Miscellaneous	2,055	24.9
Total	8,245	100.0

Land Ownership	Acres	Percent
Private	7,254	88.0
State-Local	111	1.3
Federal	880	10.7
Total	8,245	100.0

Number of farms in planning area: 26

Average farm size: 50 Acres

Prime and important farmland in planning area: 635 Acres

Number of minority farmers: 7

Project Beneficiary Profile: The planning area is primarily comprised of agricultural land, with some residential development. However, the majority of the planning area is within the city boundaries of San Antonio, Converse, and Schertz, and future

development is anticipated. The reservoir is used for flood control and incidental recreational activities. Abandonment of the dam by excavating a breach section through the embankment would result in increased flood damages to downstream residences and roadways. The elimination of the reservoir would also result in a decrease of recreational visitor days to the site. As such, private landowners, recreational users, local governments, and the State government are the primary beneficiaries of this project.

Approximately 48% of the beneficiaries within the project area are male and 52% are female. The per capita income ranges from \$18,143 to \$22,014, compared to Texas per capita income of \$19,617 and \$21,587 for the United States. The population of the project area is about 71 percent white, 14 percent black, less than 1 percent American Indian, 2 percent Asian, and 8 percent other racial groups, while 4 percent reported being two or more races.

Wetlands: Approximately 7.8 acres of low quality forested wetlands (palustrine).

Flood plains: Approximately 1,129 acres are located downstream within the breach area of FRS No. 6A.

Highly erodible cropland: None

Fisheries: A 52 surface acre sediment pond (lacustrine) and associated stream system.

Endangered species: No federally listed threatened or endangered species or suitable habitats for listed species are present.

Cultural resources: No historic properties (i.e. eligible for National Register of Historic Places)

Problem Identification: Urban development in the downstream watershed since FRS No. 6A was originally constructed has resulted in the dam not meeting current dam safety standards. Since a failure of the dam would result in potential loss of life and significant damage to downstream infrastructure and properties, both the Natural Resources Conservation Service (NRCS) and the State of Texas have reclassified the dam from low hazard to high hazard. Approximately 6 people downstream are at risk should the dam fail. This is a very conservative figure, considering it is based only on people living within the breach area of FRS No. 6A and does not include motorists traveling on roadways downstream of the dam. Roadways and bridges within the breach area of the dam include Interstate Highway 10 (I-10), which had a 2004 average daily traffic count of 32,000 vehicles and is a major thoroughfare between San Antonio and Houston; Scenic Lake Drive, which is within the City of Schertz; and two Bexar County roads (North Graytown Road, and Freudenburg Road).

Alternative Plans Considered: Alternative plans considered are the (1) No Action or Future Without Project (controlled breach of FRS No. 6A); (2) Decommission of FRS No. 6A (partial removal of FRS No. 6A); and (3) Rehabilitation of FRS No. 6A by raising the top of dam 3.1 feet, adding a new 36" diameter hooded inlet type principal spillway and impact basin, leave existing 42 inch principal spillway pipe and riser in place, adding a splitter dike in each auxiliary spillway, and widening each auxiliary spillway by 50 feet.

Brief Description of Each Alternative

Alternative No. 1 – Future Without Project

This alternative, which does not involve federal action, consists of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event. This breach would be a minimum size opening in the dam from top of dam down to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam. Incidental fishing recreation benefits would be lost, but the model airplane club would continue to lease land from SARA. This course of action would minimize the sponsor's dam safety liability but would not eliminate all liability. In order not to impede flows through the breached embankment, the principal spillway components would be removed. The material (about 20,000 cu yd) would be placed in the present easement area. The remaining exposed area (about 10 acres) would be vegetated to control erosion.

Since the 100-year floodplain would be enlarged due to the absence of flood protection, any future downstream development would be altered to account for the enlarged 100-year floodplain. Upstream land values would not be affected. The dam and land currently covered by the sediment pool would be maintained as a greenbelt area. The estimated cost of this alternative is \$198,000.

Alternative No. 2 - Decommission FRS No. 6A.

This alternative removes the storage function of the dam and reconnects, restores, and stabilizes the stream and floodplain functions. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam. Incidental recreation benefits would be lost. Partial removal of the embankment would consist of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event. This would eliminate the structure's ability to store water. In order not to impede flows through the breached embankment, the principal spillway components would be removed. Excavated material (about 20,000 cu yd) would be placed in the sediment and detention pool areas and all exposed areas would be vegetated as needed for erosion control (about 50 acres). Riparian vegetation would be established along the stream channel (about 12 acres). Channel work would be installed to reconnect the stream channel through the sediment pool.

Since the 100-year floodplain would be enlarged due to the absence of flood protection, any future downstream development would be altered to account for the enlarged 100-year floodplain. Upstream land values would not be affected. The dam and land currently covered by the sediment pool would be maintained as a greenbelt area. Estimated cost of this alternative is \$833,700.

Alternative No. 3 – Rehabilitation of FRS No. 6A

This alternative consists of leaving the existing drop inlet type principal spillway and connecting 42" pipe intact and adding a 36" diameter hooded inlet type principal spillway with an impact basin. The release channels of the two principal spillways would be connected. The crest elevation of both existing auxiliary spillways would remain unchanged, however one splitter dike would be added in each auxiliary spillway and both auxiliary spillways would be widened by 50 feet. The top of the dam would be raised by 3.1 feet to elevation 634.2. Modifications to FRS No. 6A would insure compliance with

current safety and performance standards. The program life of the structure would be extended for an additional 100 years. The 100-year floodplain downstream of FRS No. 6A would be unchanged. Incidental recreation benefits would be maintained. Upstream land values would not be affected by the project. Estimated cost is \$1,627,100.

Project Purpose: Flood Prevention.

Principal Project Measure: Rehabilitation of FRS No. 6A.

Project Costs:	<u>Federal funds</u>	<u>Other Funds</u>	<u>Total</u>
	\$1,151,500	\$475,600	\$1,627,100

Project Benefits: Economic benefits of the project are derived from assuring the continued performance of FRS No. 6A by meeting current performance and safety standards. Benefits are based on continuing flood protection to the downstream area, maintaining downstream property values, maintaining incidental recreation opportunities, and avoiding projected costs associated with implementing Alternative No. 1. Total average annual benefits are estimated to be \$119,600, which include updated original downstream benefits (\$21,300), maintaining downstream property values (\$51,000), maintaining incidental recreation opportunities (\$36,100), and saving the sponsors the cost of a controlled breach (\$11,200). Also, potential risk of loss of life (about 6 residents located within the breach area and motorists traveling on downstream roadways) from a dam failure would be minimized.

Other Impacts: Recreational opportunities would not only be maintained, but could be enhanced due to a quicker draw-down time of the detention pool following storm events due to the presence of the additional principal spillway. Debris clean-up after major storm events could be done sooner, thus allowing recreational opportunities to commence sooner.

Environmental Values Changed or Lost: No compensatory mitigation is planned. Installation of the preferred alternative will disturb only a minimal amount of grassland vegetation. Disturbed areas will be replanted with adapted native and/or introduced grasses.

Major Conclusions: Rehabilitation of FRS No. 6A would minimize the potential risk of loss of life within the breach area, allow the continuance of flood prevention and incidental recreational benefits, and maintain downstream property values.

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

Issues to be Resolved: Any discharge of dredged or fill material in a water of the US associated with rehabilitation of FRS No. 6A would require a Department of the Army permit under Section 404 of the Clean Water Act of 1972. Also, for projects with disturbances equal to or greater than five acres it is necessary to have a Storm Water Pollution Prevention Plan (SWPPP) in place at least 48 hours prior to and during construction of the proposed project and filing a Notice of Intent with the Texas Commission on Environmental Quality is required. A Notice of Termination (NOT) must be filed once the site has reached final stabilization. The sponsors will provide leadership in developing an Emergency Action Plan (EAP) prior to construction and will review and update the EAP annually with local emergency response officials.

PURPOSE AND NEED FOR ACTION

INTRODUCTION

Within the 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 most of the floodwater retarding structures in the Martinez Creek Watershed. The U. S. Army Corps of Engineers (USACE), the Texas Commission on Environmental Quality (TCEQ) and the NRCS have mutually determined that Martinez Creek Watershed FRS No. 6A is a high hazard structure based on current criteria. The auxiliary spillways have functioned numerous times with up to 2.5 feet of flow during a 1998 storm event. There are human health and safety concerns about the performance of this dam. The dam is approaching the original planned program life.

When Martinez Creek Watershed was planned, the original intent of the floodwater retarding structures was to protect agricultural areas downstream. Less than 100 people lived in the basin and the economy was almost entirely agricultural (cropland and grassland). However, forty years later, urban sprawl has consumed the watershed as the result of a significant increase in population. Specifically, FRS No. 6A is located on the east side of San Antonio just north of the I-10/Loop 1604 intersection, both of which are major thoroughfares within the San Antonio Metropolitan Statistical Area. Because of its proximity to this intersection, the area around FRS No. 6A has seen tremendous growth. The dam, auxiliary spillways, and sediment pool are located within the city limits of San Antonio and Schertz. Portions of the upstream area are within the City of Converse. The area downstream of the dam to I-10 is within the City of Schertz, a suburb of San Antonio whose population more than doubled from 10,555 in 1990 to 24,975 in 2004 (Bureau of Census data). San Antonio's city limits run along the I-10 corridor downstream of FRS No. 6A. The area below I-10 down to Freudenburg Road is unincorporated (Bexar County). As a result of the unpredicted population growth within the Martinez Creek Watershed, FRS No. 6A needs to be upgraded to meet current performance and safety standards and ensure continued protection of the watershed and the lives of people downstream.

PURPOSE AND NEED FOR THE PROJECT

This Supplemental Watershed Plan/Environmental Assessment was prepared to implement the rehabilitation of FRS No. 6A. FRS No. 6A was originally installed under the authority of the Watershed Protection and Flood Prevention Act of 1954 (PL83-566) as amended. The rehabilitation of FRS No. 6A is authorized under Public Law 83-566 (as amended), and as further amended by Section 313 of Public Law 106-472.

The purposes of FRS No. 6A rehabilitation project are to maintain present level of flood control benefits, comply with the current performance and safety standards, and extend the service life of the structure. FRS No. 6A was built in 1966 in a rural setting and is now strongly influenced by urban development. In particular, there are residences, interstate highway and county roads downstream that would be impacted by a dam failure of FRS No. 6A. This potential risk to loss of life has caused the dam to be reclassified as a high hazard dam. Because of urban encroachment, rehabilitation of FRS No. 6A is needed to protect downstream properties and infrastructure, and reduce the potential risk to loss of life. The rehabilitation of FRS No. 6A would ensure the service life of the dam for a minimum of 100 additional years.

WATERSHED PROBLEMS AND OPPORTUNITIES

The primary concern is the safety of FRS No. 6A and the potential problems that failure of the dam would cause. Approximately 6 people living downstream of FRS No. 6A are at risk should the dam fail. This estimate does not include motorists that might be traveling on Scenic Lake Drive, North Graytown Road, or Freudenburg Road which are all located downstream of the dam, nor does it include potential motorists on I-10 and the north and south access roads to I-10. All of these roads would be affected by a breach of the dam should it overtop and fail. The basic objective of the project is to provide continued flood protection and reduce the risk of loss of human life.

Currently FRS No. 6A is functioning as originally planned and providing downstream flood damage protection from the 22-year, 24-hour storm, however there is a possibility of the dam failing from overtopping if a storm occurs greater than the structure was constructed to control. Total estimated damages from a catastrophic breach of FRS No. 6A would approach \$1,000,000 and the potential risk to loss of human life would be significant.

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

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

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

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

Table A presents the results of the scoping process:

<i>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	Low	Low	No Impact
Cultural Resources	Low	Low	No Impact
Prime Farm Lands	Low	Low	Minimal Impact
Wetlands	Low	Low	
Air Quality	Low	Low	
Water Quality	Medium	Medium	
Water Quantity	Medium	Medium	
Aesthetics	Low	Low	
Sedimentation	Medium	Medium	
Land Values	High	High	
Fish & Wildlife Habitat	Medium	Medium	
Recreation	High	High	

AFFECTED ENVIRONMENT

This Supplemental Plan/Environmental Assessment is for the watershed upstream of FRS No. 6A and the downstream area affected by a breach of the existing dam (Appendix C). FRS No. 6A was constructed in the middle reaches of Salitrillo Creek, a tributary of Martinez Creek Watershed. The watershed is located in the San Antonio River Basin. FRS No. 4 and FRS No. 5 are constructed upstream of FRS No. 6A on the west and east tributaries of Salitrillo Creek that confluence and drain into FRS No. 6A. A description of the Martinez Creek Watershed can be found in the Martinez Creek Watershed Work Plan dated October 1958.

The rehabilitation project area is 8,245 acres that consist of the uncontrolled drainage area of FRS No. 6A plus the area that would be inundated by a breach of the dam in excess of the 100-year flood. The area is located within the city limits of the Cities of Converse, San Antonio, and Schertz, Bexar County, Texas. All of the 8,245 acres are either urbanized or projected to be urbanized within the near future. Land uses are residential, commercial, lakes, parks, grazing lands, cropland, and open areas.

EXISTING CONDITIONS

Original Project

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 are the Alamo SWCD and SARA. Federal assistance was provided by the United States Department of Agriculture (USDA), Soil Conservation Service (now the Natural Resources Conservation Service or NRCS). A total of six floodwater retarding structures were planned and constructed during 1962 through 1966. Two previous supplements to the original 1959 plan have been prepared and approved to facilitate the rehabilitation of FRS Nos. 4 and 5.

Description of Existing Dam

FRS No. 6A was originally designed and constructed in 1966 as a low hazard class (a) dam, a hazard classification given to dams that do not pose a threat to loss of life. It was constructed as a homogenous earth fill dam with two vegetated auxiliary spillways totaling 800 feet in width. The principal spillway is a 42-inch diameter reinforced concrete pipe connected to a 3.5-foot by 11-foot by 11-foot two stage inlet with a crest elevation of 617.5. The inlet structure is ported at two elevations to facilitate lowering the permanent water level below the principal spillway crest. The four upper ports are 24" by 12" with two located on each side of the inlet structure with an invert elevation of 613.75. The lower ports consist of three 24" by 12" ports on each side of the inlet structure and one 20" by 12" port on the front and back of the inlet structure. The lower ports have an invert elevation of 611.7 which is the sediment pool elevation and restricts the sediment pool capacity to 200 acre feet. The sediment pool consist of a 52-acre lake. There were no foundation drains planned or installed when FRS No. 6A was originally constructed. During the planning process there were no indications that foundation drains are needed for the rehabilitated structure. The total storage capacity below the elevation of the auxiliary spillway is 2970 acre-feet with 894 acre-feet reserved for sediment accumulation over a 50-year period. The remaining 2076 acre-feet is reserved for floodwater detention storage. The maximum height of the dam is 34 feet. The surface area of the current sediment pool is about 52 acres according to the 2005 topographic survey. FRS No. 6A was constructed as a low hazard dam designed to store the sediment expected to accumulate over a 50-year period and provide floodwater storage. Sufficient floodwater detention storage was provided for a 4.55 percent chance of the auxiliary spillways functioning in any year (22-year, 24 hour storm).

The embankment is in excellent condition. A thick stand of coastal bermudagrass covers the front and back slopes and both auxiliary spillways. SARA fertilizes the embankment and auxiliary spillways as needed to maintain this protective cover and hay is harvested several times a year from these areas. No brush or trees are allowed to grow on the embankment. The inlet and principal spillway were visually inspected and an internal camera was used to inspect the conduit. Both are in excellent condition. The dam has no stability or foundation problems.

The presence of FRS No. 6A provides for several recreational activities. Currently, a radio controlled airplane club leases some land from SARA that is adjacent to the southern part of the sediment pool (actually within the detention pool area). This area is very flat and provides an ideal "airfield" for model airplanes. Also, access to the sediment pool is allowed by the

landowner located on the northern side of the sediment pool for fishing purposes. A conservative estimate for both of these activities is about 2,000 visitor days per year.

Existing Structural Data:

Table B shows the existing structural data for Martinez Creek Watershed FRS No. 6A:

Table B – Existing Structural Data - Martinez Creek Watershed FRS No. 6A	
Year Completed	1966
Drainage Area	7,116 acres
Stream	Salitrillo Creek
Purposes	Flood Prevention, Watershed Protection
Dam Type	Homogenous Earthfill
Dam Height	34 feet (ft.)
Dam Volume	165,180 cubic yards
Dam Crest Length	1478 ft. (excluding auxiliary spillway)
Sediment	894 acre-feet
Flood	2,076 acre-feet
Principal Spillway:	
Type	Reinforced Concrete
Inlet Height	14.0 ft. ^{1/}
Conduit Size	42 inches
Stages	2
Auxiliary Spillway:	
Type	Vegetated Earthen
Width	Left-500 ft. Right-300 ft. Total-800 ft.
Principal Spillway Crest	617.5 ft. MSL (North American Datum 1927 [NAD27])
Auxiliary Spillway Crest	625.8 ft. MSL (NAD27)
Top of Dam (Minimum Crest)	631.1 ft. MSL (NAD27)

^{1/}Overall height 14.0 feet, inside dimensions 3.5 feet by 11 feet by 11 feet.

Physical Features and Environmental Factors

Project location: The Martinez Creek Watershed, located in Bexar County, Texas, is comprised of 56,000 acres (about 87.5 square miles). Of this total, the drainage area for FRS No. 6A is 7,116 acres. The watershed heads approximately 3 miles west of the City of Converse in the northeast corner of Bexar County, Texas. Martinez Creek Watershed FRS No. 6A is located at Latitude, decimal degree 29.47 and Longitude, decimal degree 98.58. The watershed is located within the San Antonio River Basin as delineated by the United States Water Resources Council, hydrologic unit number 12100304.

Topography: The project area lies within the rolling hills of the Blackland Prairie Physiographic Area. Topography ranges from steeply sloping to gently rolling in the upland areas and is nearly level along the alluvial valleys.

Soils and Geology: Soils in the vicinity of the FRS No. 6A dam, spillway, and reservoir area are typical of the south central Texas rolling Blacklands. The moderately sloping to steep uplands contain Houston Black clay and Houston Black gravelly clay while the narrow, long, irregularly shaped flood plain contains Trinity and Frio soils, frequently flooded (USDA, June

1991 Reissued). 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.

Geologically, the site is located on claystone and siltstone of the undivided Cretaceous Age Navarro Group and Marlbrook Marl ("upper Taylor marl"). The claystone on the site is described as silty, and breaks down with difficulty to moderately to highly plastic clay. There are small localized areas within the claystone that include slight amount of carbonates.

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).

Climate: 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.

Cultural Resources: No prior cultural resources identification activities have taken place in association with the original Martinez 6A project. The dam and reservoir was constructed in 1966, 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. The Mescalero Apache Tribe of the Mescalero Reservation, New Mexico has a claim to a land area that includes Bexar County, Texas (NPS 2006). 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 January 2006 did not reveal any recorded archeological or historic sites in the vicinity of the proposed project (THC 2006). NRCS and the Texas State Historic Preservation Officer (SHPO) have agreed that a cultural resources survey should be completed on all areas of new disturbance associated with potential rehabilitation measures. Accordingly, the NRCS cultural resources specialist conducted a survey of areas of potential new disturbance associated with the prospective rehabilitation alternative at Martinez 6A in January 2006. The areas have been subject to various disturbances associated with original construction and other activities including farming/ranching practices, roads, trails, and recreational facilities.

No cultural resources were found in the areas of potential new disturbance associated with rehabilitation measures at Martinez 6A and overall there appears to be low potential for

subsurface cultural deposits in these areas. There could be some potential for subsurface deposits in the area of the existing plunge basin should it need to be modified.

The NRCS has determined pursuant to 36 CFR 800.4(d) that there are no properties included in or eligible for the National Register of Historic Places within the area of potential effect of the alternative resulting in rehabilitation of Martinez 6A. This determination was reported to the SHPO in January 2006 for review and concurrence (letter on file). The SHPO concurred in the determinations on January 27, 2006 (letter on file).

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

Prime Farmland: Soils in the project area were evaluated by the USDA-NRCS in accordance with requirements of the Farmland Protection Policy Act (FPPA). The proposed project area impacted by the rehabilitation of FRS No. 6A does contain Important Farmland as defined by the FPPA (7.2 ac Prime and Unique Farmland; 0 ac Statewide/Local Important), however the total soil index score of 137, utilizing the land evaluation and site assessment form AD-1006, was less than the 160 point threshold and “need not be given further consideration for protection” [7 CFR 658.4 (c) 2].

Fish and Wildlife Resources: FRS No. 6A is located within the city limits of Schertz and San Antonio in Bexar County, Texas in a watershed that is currently being heavily developed upstream. The structure provides approximately 52 acres of deep water and shallow water habitat with an associated stream complex and 7.8 acres of low quality forested wetland habitat. Effluent flows from the City of Converse’s waste water treatment facility upstream of FRS No. 6A provides a consistent flow of at least 4.6 cubic feet per second (cfs) in the stream which maintains a constant level in the sediment pool. Land use adjacent to the structure is private undeveloped lands used primarily for livestock grazing and crop production. The land cover is predominantly poor condition rangeland with a predominance of vegetation that is limited to low quality annual and perennial cool and warm season grasses, forbs and invading brush species. FRS No. 6A currently provides habitat for small mammals, neo-tropical songbirds, shore birds, various water fowl, and a variety of fish species. Various species of reptiles and amphibians also inhabit the project site.

Threatened and Endangered Species: The U.S. Fish and Wildlife Service (USFWS) lists 1 plant, 5 insect, 6 arachnid, 1 crustacean, 2 amphibian, 2 fish, and 2 bird species as threatened or endangered in Bexar County, Texas (Table C). Eighteen of the species are endangered, and only the San Marcos salamander is threatened.

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

Table C shows the Threatened and Endangered Species List located on the U.S. Fish and Wildlife Service Web site for Bexar County:

<i>Table C – Federally Listed T & E Species for Bexar County¹</i>			
Common Name	Scientific Name	Species Group	Listing Status
(unnamed) ground beetle	Rhadine infernalis	Insects	E
(unnamed) ground beetle	Rhadine exilis	Insects	E
Black-capped Vireo	Vireo atricapilla	Birds	E
Braken Bat Cave Meshweaver	Cicurina venii	Arachnids	E
Cokendolpher Cave Harvestman	Texella cokendolpheri	Arachnids	E
Comal Springs dryopid beetle	Stygoparnus comalensis	Insects	E
Comal Springs riffle beetle	Heterelmis comalensis	Insects	E
Fountain darter	Etheostoma fonticola	Fishes	E
Golden-cheeked Warbler	Dendroica chrysoparia	Birds	E
Government Canyon Bat Cave Meshweaver	Cicurina vespera	Arachnids	E
Government Canyon Bat Cave Spider	Neoleptoneta microps	Arachnids	E
Helotes mold beetle	Batrisodes venyivi	Insects	E
Madla's Cave Meshweaver	Cicurina madla	Arachnids	E
Peck's cave amphipod	Stygobromus pecki	Crustaceans	E
Robber Baron Cave Meshweaver	Cicurina baronia	Arachnids	E
San Marcos gambusia	Gambusia georgei	Fishes	E
San Marcos salamander	Eurycea nana	Amphibians	T
Texas blind salamander	Typhlomolge rathbuni	Amphibians	E
Texas wild-rice	Zizania texana	Flowering Plants	E

¹ Threatened and Endangered Species List as shown on U.S. Fish and Wildlife Service Web site.

Wetlands: FRS No. 6 provides approximately 52 acres of shallow and deep water lacustrine habitat and approximately 7.8 acres of low quality palustrine forested wetland habitat. The low quality wetland is located adjacent to the upstream portion of the sediment pool, and the vegetation community in the wetland is composed of black willow (*Salix niger*), hackberry (*Celtis laevigata*), Huisache (*Acacia smallii*), giant ragweed (*Ambrosia trifida*), and sedges (*Cyperus* spp.). Hydrology for the wetland is a combination of the constant flow from the upstream wastewater treatment facility, inundation during storm events due to the FRS, and prolonged inundation due to the road bed for Loop 1604.

STATUS OF OPERATION AND MAINTENANCE

SARA will be responsible for the maintenance of FRS No. 6A. SARA and the Alamo SWCD will jointly be responsible for the operation of the structure. Inspections of the dam indicated that the dam is being operated and maintained properly. The cities of Converse, Schertz, and San Antonio actively enforce EPA's Storm Water Pollution Prevention Plans (SWPPPs) concerning new development, and prevent development from encroaching upon the 100-year floodplain.

The dam is in excellent condition. A thick stand of coastal bermudagrass covers the front and back slopes of the dam and auxiliary spillways. SARA fertilizes the dam and auxiliary spillways as needed to maintain this protective cover and no brush or trees are allowed to grow on these areas. The inlet and principal spillway were visually inspected and an internal camera was used to inspect the conduit. Both are in excellent condition.

SEDIMENTATION

The fine-grained rocks and soils, gentle topography and stable land use suggest comparatively low sedimentation rates. Historic sedimentation rates in the vicinity of the watershed are comparatively low for Texas (Bernard et.al., 1995).

Investigations indicate that the dam, including the principal spillway, is structurally sound and is being properly maintained. The sediment survey and predictive soil loss equations completed in 2005, indicates that there are well over 100 years of available sediment storage capacity remaining below elevation 611.7 (lowest ungated outlet). The accumulated sediment in the sediment and detention storage areas was not tested as it will not be disturbed during the rehabilitation of the FRS No. 6A.

The original planned total sediment volume was 894 ac-ft or 17.88 ac-ft/yr. This volume was broken down as follows: 200 ac-ft in the sediment pool (below elevation 611.7, lowest ungated outlet), 593 ac-ft of sediment reserve (between lowest ungated outlet elevation of 611.7 and principal spillway crest elevation of 617.5), and 101 ac-ft of aerated sediment storage in the detention pool (above elevation of 617.5).

The 2005 sediment survey showed an accumulation of 104.9 ac-ft of sediment volume indicating that the actual sediment rate was 2.7 ac-ft /yr. The survey also indicated that 95.1 ac-ft of volume remained below the sediment pool elevation of 611.7 (available for future sediment storage). Due to the dramatic change in land use from agricultural to a rural urban interface, the estimated future sediment rate is calculated to be 0.42 ac-ft per year. Due to updated future sediment rate predictions, 694 acre feet of volume originally dedicated to sediment reserve and aerated sediment storage will now be utilized exclusively for detention storage for the program life of the project. The rehabilitation design of FRS No. 6A is for a program life of 100 years. The remaining available sediment volume is 95.1 ac-ft (below elevation 611.7). The sediment volume needed for the 100 year program life of the rehabilitated structure is 35.7 ac-ft submerged and 7.2 ac-ft aerated for a total of 42.9 ac-ft.

BREACH ANALYSIS AND HAZARD CLASSIFICATION

Martinez Creek Watershed FRS No. 6A does not meet current dam design and safety requirements. The dam was originally constructed in 1966 as a class (a) low hazard structure for the purpose of protecting downstream agricultural lands from flooding. Exceptional population growth in the area since 1966 has dramatically changed the land use to predominately suburban. As a result of this population growth, several residents and four roadways are now at risk from a catastrophic breach of FRS No. 6A.

The NRCS hazard classification now identifies this dam as a class (c) high hazard structure. The Texas Commission on Environmental Quality, Safe Dams Program, has agreed on the reclassification of the structure to "high hazard". The high hazard classification is based on the potential risk to loss of life concerning at-risk residences and a major highway located in the downstream dam breach flood zone area. FRS No. 6A has been identified as a high hazard dam as a result of (1) two at-risk residences in the area that will be potentially affected by a breach of the dam, and (2) I-10, located downstream, a major transportation route between San Antonio and Houston.

Breach studies indicate that I-10 would be overtopped by approximately 1.6 feet if the dam failed, resulting in property and infrastructure damages. According to Texas Department of Transportation (TXDOT), there was an average daily traffic (ADT) count of 32,000 vehicles using I-10 at or near the highway's bridges that cross Salitrillo Creek during 2004. Such a large volume of daily traffic was instrumental in determining the hazard reclassification of FRS No. 6A to high hazard. There are three other downstream roadways affected by a breach of FRS No. 6A. These crossings of Salitrillo Creek are located along Scenic Lake Drive, North Graytown Road, and Freudenburg Road (see Appendix C, Breach Inundation Map). However, since none of these roads are considered major highways, their location within the breach area did not have a bearing on reclassification of FRS No. 6A.

Also, there are 2 residential properties downstream of the dam that would be at-risk in the event of a breach, resulting in about 6 people being subjected to potential risk to loss of life. Although the breach floodwaters would not reach the first floor elevations of either residence, the escape routes of the inhabitants would be subjected to flooding from the breach waters. Thus, it was determined that an attempt to flee from the residences as a result of breach floodwaters would result in a life-threatening situation, and the threat to loss of life would be prevalent.

Although the structure is presently sound, there is always the risk of failure. The most likely cause of FRS No. 6A 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 29,100 cubic feet per second (cfs). See Appendix C, Breach Inundation Map.

POTENTIAL MODES OF DAM FAILURE

Both NRCS and the State of Texas recognize that Martinez Creek Watershed FRS No. 6A is now a high hazard dam. Several potential modes of failure were examined as follows:

Sedimentation – Sediment can be deposited in both the sediment pool (the area below the principal spillway crest) and flood detention pool (the area between the principal spillway crest and the auxiliary spillway crest). When the sediment pool has filled to the elevation of the

principal spillway inlet, the pool no longer has permanent water storage. As the detention pool loses storage due to sediment deposition, the auxiliary spillway operates, or has flowage, more often and is therefore subject to erosion. A potential mode of failure exists as the auxiliary spillway continues to degrade, and depth and frequency of flow increases. The dam will ultimately breach.

FRS No. 6A was designed with a 50-year sediment storage life. A reservoir sediment survey was conducted in 2005. The sediment survey and predictive soil loss equations indicate that while some sediment has accumulated, FRS No. 6A has sufficient storage capacity remaining for at least another 100 years. With the change in upstream land use, the projected sediment load was decreased dramatically. Future sediment load is expected at the same rate or less as the land use continues to change from agricultural to urban. Therefore, in the near future, sedimentation presents a low potential mode of failure for FRS No. 6A.

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

FRS No. 6A was originally designed to temporarily store the runoff from 6.5 inches of rain falling in 6 hours plus an additional 2.4' of elevation without overtopping the embankment. Current criteria requires FRS No. 6A to temporarily store the PMP storm of 30.5" in 6 hours without overtopping the embankment. Therefore, the potential for FRS No. 6A to fail due to a deficiency in hydrologic capacity is judged to be low.

Seepage – Seepage is the primary geotechnical concern on FRS No. 6A. Embankment and foundation seepage can contribute to failure of an embankment by removing (piping) soil material through the embankment or foundation. As the soil material is removed, voids can be created, allowing ever increasing amounts of water to flow through the embankment or foundation until the dam collapses due to the internal erosion. Seepage that increases with an increase in pool elevation is an indication of a potential problem, as is stained or muddy water. Foundation and embankment drainage systems can alleviate the seepage problem by removing the water without allowing soil particles to be transported away from the dam.

FRS No. 6A shows no visible signs of seepage or sloughing or any other noticeable indications of instability on the embankments. FRS No. 6A is protected with a healthy cover of perennial grass, and no trees are present on the embankment sections. Therefore, in the near future, seepage presents a low potential mode of failure for FRS No. 6A, but it should continue to be monitored in the future.

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

The Martinez Creek Watershed is not located within an area of significant seismic risk; therefore, seismic activity creates only a very small potential as a mode for failure of FRS No. 6A.

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

FRS No. 6A shows no visible signs of slope failure or sloughing or any other noticeable indications of instability on the embankments. The embankments of FRS No. 6A are protected with a healthy cover of perennial grass and no trees are present on the embankments. Therefore, embankment slope failure presents a low potential mode of failure for FRS No. 6A, but it should continue to be monitored in the future.

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

Based on available information and field observations, the structure appears to be in extremely good condition with no evidence of deterioration on any of the materials that would require structural repair at this time. A pipe inspection video of the existing principal spillway conduit was viewed to assess the condition of the existing conduit. The conduit appears to be in excellent condition. As a result, the potential failure of the existing dam due to deteriorating components is judged to be low. However, due to the age of the existing structural components, FRS No. 6A should continue to be monitored annually and after significant storm events.

CONSEQUENCES OF DAM FAILURE

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

Two residential properties downstream of the dam would be at-risk in the event of a breach, resulting in about 6 people being subjected to potential risk to loss of life. Although the breach floodwaters would not reach the first floor elevations of either residence, peoples' lives would be endangered as a result of attempting to flee from the breach floodwaters.

If the dam fails, I-10, a major traffic thoroughfare between San Antonio and Houston, would be overtopped by approximately 1.6 feet of water at a maximum velocity of 5 feet per second (Table D). The two I-10 frontage road bridges would be overtopped by about 2.6 feet of floodwaters; however traffic flow volume is much lower than the main highway. All vehicles on I-10 would be washed downstream, the road surface would be damaged, and the I-10 bridges would most likely be damaged or at least impassable. Traffic would be disrupted while the bridges and roadways are being repaired, thus affecting about 32,000 vehicles per day. The potential for loss of human life would be extremely high considering the amount of traffic that occurs on I-10 on a daily basis.

Breach waters would also overtop Scenic Lake Drive by about 9 feet, North Graytown Road by 3.7 feet and Freudenburg Road by 2.0 feet. Although these roads are not well-traveled, they would receive significant damage and would be impassable until repairs could be made.

Table D shows the effects of a breach of FRS No. 6A on downstream crossings:

Downstream Crossing	Depth Over Crossing (ft) <i>1/</i>	Daily Traffic Count (#)
Scenic Lake Drive	9.0	N/A
I-10 Main Highway <i>2/</i>	1.6	32,000
North Graytown Road	3.7	N/A
Freudenburg Road	2.0	N/A

1/ Maximum velocities for identified crossings ranged from 4 to 7 feet per second.
2/ Frontage roadways are about 1.0 feet lower than main highway.

Total estimated damages from a catastrophic breach of FRS No. 6A would approach \$1 million. As a result of a breach approximately 20,000 cubic yards of fill material from the dam would move downstream, clogging stream channels and increasing flooding on roads and bridges.



Interstate Highway 10, Foreground-Westbound lane, Background-Eastbound lane. A breach of FRS No. 6A would overtop I-10 by 1.6 feet which is approximated by the tip of the yellow arrow.

ALTERNATIVES

FORMULATION PROCESS

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

The Future Without Project alternative serves as a baseline to evaluate the other alternatives. It depicts the most probable future conditions in the absence of a federally assisted project. 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 Project baseline, present conditions were developed. The dam does not meet current safety standards for a dam in this location and there is a risk of the dam failing from overtopping. An analysis of the dam indicated that the Probable Maximum Precipitation (PMP) 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.

Failure of the dam would result in significant damage and potential risk to loss of life. If the dam fails SARA would then be liable for the downstream damages. SARA considered the following options in deciding the most likely course of action:

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

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

Alternatives eligible for financial assistance under The Watershed Protection and Flood Prevention Act (PL 83-566) as amended by the Watershed Rehabilitation Amendments of 2000 and alternatives ineligible for financial assistance were developed. To be eligible for federal assistance, an alternative must meet the requirement as contained in Public Law 106-472.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

A wide range of non-structural and structural measures were considered singly and in combination as alternatives were formulated. Non-structural measures included flood plain management, liability insurance, zoning, flood warning systems, flood proofing of properties, and installation of storm water detention structures. These non-structural alternatives were cost prohibitive and did not meet the purpose of the project.

Another non-structural alternative considered but rejected as economically infeasible was the purchase of deed restrictions of all land outside of the current 100-year floodplain but within the breach area, and relocating residences within the breach area. The estimated cost of this alternative (\$4,679,100) was based on complying with all of the policies and procedures of the NRCS and 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).

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

Decommissioning of the dam by total removal of the embankment was eliminated due primarily to cost considerations. Another factor influencing the decision was the type of future downstream development. The dam and surrounding land is currently zoned industrial by the cities of San Antonio and Schertz. The area downstream of the dam to I-10 is currently zoned industrial and general business by the City of Schertz. Due to the absence of potential residential properties near or around the dam, the total removal of the embankment for reasons of aesthetics was determined not to be significant enough to warrant the additional cost.

An alternative to provide for containing the 100-year storm event was considered: raise the top of the dam and install an RCC spillway on top of the dam. Project costs, especially construction and land rights, would far outweigh benefits from this alternative. In order to reduce both construction and land rights costs, another alternative was considered: raise the elevation of both auxiliary spillways in order to contain the 50-year storm event. However, primarily due to land rights costs, this alternative also failed to produce positive net benefits.

DESCRIPTION OF ALTERNATIVE PLANS

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

Alternative No. 1 – No Action or Future Without Project

Under this alternative, no additional federal funds would be expended on the project. This alternative consists of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event with no influence on the water surface profile. This breach would be a minimum size opening in the dam from top of dam down to the valley floor, which would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam. This course of action would minimize the sponsor's dam safety liability but would not eliminate all liability. Incidental recreation fishing benefits would be lost, but the model airplane club would continue to lease land from SARA. The material (about 20,000 cu yd) would be placed in the present easement area. The remaining exposed area (about 10 acres) would be vegetated to control erosion. The remaining portion of the embankment and the land currently covered by the sediment pool would be maintained as a greenbelt area. Upstream property values would not be affected.

In order not to impede flows through the breached embankment, the principal spillway components would be removed. Removal of the components would also insure that visitors (primarily children accompanying members of the model airplane club) would not be

subject to injury by climbing on or around the exposed components. Since the 100-year floodplain would be enlarged due to the absence of flood protection, any future downstream development would be altered to account for the enlarged floodplain. Without the presence of FRS No. 6A, floodwaters from a 100-year storm event would overtop I-10 main bridges by about 1.0 feet, and frontage road bridges by about 2.0 feet. When contacted about this scenario, Texas Department of Transportation (TXDOT) officials stated that the bridges would not be raised unless they are being replaced or widened, and such decision would be made only after a new hydraulic study. Construction of the bridges was completed in 1962, and they have a design life of 75-100 years. Based on TXDOT's response and the expected remaining life of the bridges, it was determined that no modification of the I-10 bridges to accommodate the enlarged 100-year floodplain was warranted. With FRS No. 6A in place, the 100-year storm currently overtops the other roadways and bridge crossings downstream of FRS No. 6A. Therefore, no further modifications would be expected due to an enlarged floodplain. The estimated cost of this alternative is \$198,000.

Alternative No. 2 - Decommission FRS No. 6A

This alternative removes the storage function of the dam and reconnects, restores, and stabilizes the stream and floodplain functions. Although complete removal of the embankment is sometimes required for decommissioning, a partial removal of the embankment would take place. Partial removal of the embankment would consist of excavating a breach in the dam of sufficient size to safely pass the 100-year, 24-hour frequency flood event with no influence on the water surface profile. This would eliminate the structure's ability to store water. Downstream flooding conditions would be similar to those that existed prior to the construction of the dam. Incidental recreation fishing benefits would be lost, but the model airplane club would continue to lease land from SARA. Since the 100-year floodplain would be enlarged due to the absence of flood protection, any future downstream development would be altered to account for the enlarged 100-year floodplain. Upstream land values would not be affected. The remaining portion of the embankment and land currently covered by the sediment pool would be maintained as a greenbelt area. Excavated material (about 20,000 cu yd) would be placed in the sediment and detention pool areas and all exposed areas would be vegetated as needed for erosion control (about 50 acres). Riparian vegetation would be established along the stream channel (about 12 acres). Channel work would be installed to reconnect the stream channel through the sediment pool.

In order not to impede flows through the breached embankment, the principal spillway components would be removed. Removal of the components would also insure that visitors (primarily children accompanying members of the model airplane club) would not be subject to injury by climbing on or around the exposed components. Since the 100-year floodplain would be enlarged due to the absence of flood protection, any future downstream development would be altered to account for the enlarged floodplain. Without the presence of FRS No. 6A, floodwaters from a 100-year storm event would overtop I-10 main bridges by about 1.0 feet, and frontage road bridges by about 2.0 feet. When contacted about this scenario, Texas Department of Transportation (TXDOT) officials stated that the bridges would not be raised unless they are being replaced or widened, and such decision would be made only after a new hydraulic study. Construction of the bridges was completed in 1962, and they have a design life of 75-100 years. Based on TXDOT's response and the expected remaining life of the bridges, it was determined that no modification of the I-10 bridges to accommodate the enlarged 100-year floodplain was warranted. With FRS No. 6A in place, the 100-year storm currently overtops the other roadways and bridge crossings downstream

of FRS No. 6A. Therefore, no further modifications would be expected due to an enlarged floodplain. The estimated cost of this alternative is \$833,700.

Alternative No. 3 – Rehabilitation of FRS No. 6A

This alternative consists of modifying FRS No. 6A to meet current performance and safety standards for a high hazard dam. The modification will consist of rehabilitation of FRS No. 6A by raising the top of dam 3.1 feet to elevation 634.2, leaving the existing 3.5-foot by 11-foot by 11-foot drop inlet type principal spillway and connecting 42-inch pipe intact, and adding a new 36-inch hooded inlet type principal spillway at elevation 611.7 (elevation of existing low stage port) with an impact basin. Release channels from both principal spillways will be connected. The crest elevation for both existing auxiliary spillways will remain unchanged; however the existing auxiliary spillways will be widened 50 feet to accommodate the construction of splitter dikes. Because of the additional principal spillway, floodwater detention storage will be provided for a 4 percent chance of the auxiliary spillways functioning in any year (25-year frequency). Since it did not involve a safety issue, concurrence was acquired from the national design engineer to have a 25-year level of protection for the auxiliary spillways. The program life of the structure would be extended for an additional 100 years. The 100-year floodplain downstream of FRS No. 6A would be unchanged. Incidental recreation benefits would be maintained. Upstream land values would not be affected by the project. Estimated cost of this alternative is \$1,627,100.

For water and related land resources implementation studies, standards and procedures have been established in formulating alternative plans. These standards and procedures are found in "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)". According to P&G, an alternative that reasonably maximizes net national economic development benefits is to be formulated. This alternative is to be identified as the national economic development (NED) plan. During the process of formulating alternatives, the NED alternative was determined to be one of the three alternatives listed above.

COMPARSION OF ALTERNATIVES

Table E compares effects of each of the alternatives:

<i>Table E – Comparison of Effects of Alternatives</i>			
Resource Concerns	Alternative No. 1	Alternative No. 2	Alternative No. 3
NED Account ¹			
Project Investment	\$198,000	\$833,700	\$1,627,100
Annual Benefits	\$0	\$11,200	\$119,600
Annual Costs	\$0	\$44,500	\$89,000
Net Monetary Benefits	\$0	(\$33,300)	\$30,600
EQ Account ²			
Water	Loss of the sediment pool (52 acres).	Loss of the sediment pool (52 acres).	Maintain permanent water in sediment pool.
Land	Minor erosion during construction. Sediment pool converted to open area.	Minor erosion during construction. Sediment pool converted to open area.	Minor erosion during construction. 40 acres disturbed during construction.
Air	Minor adverse during construction.	Minor adverse during construction	Minor adverse during construction.
Plants & Animals	Loss of 52 acres of shallow and deep water habitat and 7.8 acres of forested wetland habitat. Area would be vegetated to native species preferred by resident wildlife species	Loss of 52 acres of shallow and deep water habitat and 7.8 acres of forested wetland habitat. Area would be vegetated to native species preferred by resident wildlife species	No Effect.
Threatened & Endangered Species	No effect	No effect	No Effect
RED Account ³			
Land Values	Values will be negatively affected in downstream area, but no effect to region.	Values will be negatively affected in downstream area, but no effect to region.	Values maintained in downstream area with no effect to region.
OSE Account ⁴			
Human Resources	Reduced threat to loss of life. More frequent flooding.	Reduced threat to loss of life. More frequent flooding.	Reduced threat to loss of life. Increased Flood Protection.
Recreation	Loss of fishing due to loss of sediment pool; no effect to model airplane club.	Loss of fishing due to loss of sediment pool; no effect to model airplane club.	Recreation opportunities maintained.
Cultural Resources	Potential effect if cultural resources present	Potential effect if cultural resources present	No effect

¹ NED – National Economic Development: Sponsors would incur \$198,000 cost in the absence of federal action. This annualized cost (\$11,200) is included instead as a benefit for Alternatives 2 and 3 since it would not be incurred if either were to be adopted.

² EQ – Environmental Quality

³ RED – Regional Economic Development

⁴ OSE – Other Social Effects

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

Item	Alternative No. 1	Alternative No. 2		Alternative No. 3	
	Future Without Project	Decommission FRS 6A		Rehabilitation of FRS 6A	
	Benefits	Benefits	Change in Benefits	Benefits	Change in Benefits
Original Downstream Benefits ^{2/}	\$0	\$0	\$0	\$21,300	\$21,300
Maintain Downstream Property Values	\$0	\$0	\$0	\$51,000	\$51,000
Maintain Incidental Recreation Benefits	\$0	\$0	\$0	\$36,100	\$36,100
Avoidance of Sponsor's Breach Cost	\$0	\$11,200	\$11,200	\$11,200	\$11,200
Total	\$0	\$11,200	\$11,200	\$119,600	\$119,600

^{1/} All numbers reflect 2005 prices.

^{2/} Updated using applicable indices and updated data.

ENVIRONMENTAL CONSEQUENCES

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

DAM SAFETY

- **Present Conditions** – The dam does not meet current safety standards for a dam in this location and there is a risk of the dam failing from overtopping. An analysis of the dam indicated that a storm of the Probable Maximum Precipitation (PMP) would overtop the dam. The risk of dam failure is low but the consequences of such a failure if it were to occur would likely be catastrophic. A breach study was made to determine the effects of a one time catastrophic breach of the existing dam. The breach of the existing dam was considered to be overtopping of the dam with a breach as wide as the maximum height of the dam. The flow from the breach would overtop Scenic Lake Drive Road with approximately 9 feet of water at a maximum velocity of 5 feet per second. North Graytown Road would be overtopped by about 3.7 feet of water at a maximum velocity of 7 feet per second. Freudenburg Road would be overtopped by 2 feet of water at a maximum velocity of 5 feet per second. Old Graytown Road which runs parallel to and between Salitrillo Creek and another tributary would also be overtopped but since it is in a common flood plain it would be difficult to determine the amount of flooding contributed by a breach of FRS No. 6A. I-10 would also be overtopped by 1.6 feet of water with a maximum velocity of 5 feet per second. The access road to I-10 would be overtopped by 2.6 feet of water with a maximum velocity of 4 feet per second.
- **Alternative No. 1** - The threat of the dam failing would be removed through a controlled breach of the dam thereby eliminating any concern for dam safety. With FRS No. 6A in place, the 100-year storm currently overtops the roadways and bridge crossings downstream of FRS No. 6A. Therefore, no further modifications would be expected due to an enlarged floodplain.
- **Alternative No. 2** - The threat of the dam failing would be removed by decommissioning the dam and removing the footprint. Other conditions as described in Alternative No. 1 would apply.

- **Alternative No. 3** - The risk of the dam failing from overtopping would be reduced by raising the effective height of the dam thereby reducing the threat of a catastrophic breach from overtopping.

HUMAN HEALTH & SAFETY

- **Present Conditions** – Although the dam is structurally safe, there is a threat of failure from overtopping by the occurrence of a PMP storm. There is a significant threat to human life and safety from dam failure. Two residences downstream of FRS No. 6A would be affected by a breach, endangering 6 people. The breach of FRS No. 6A would overtop I-10 (32,000 vehicles daily), and 3 other minor roads downstream, endangering the lives of motorists.
- **Alternative No. 1** - No threat from failure. However, potential threat from flooding would increase.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - Threat to human life and safety from a dam failure would be reduced. Flood protection would continue for residents and motorists downstream of FRS No. 6A.

FLOOD DAMAGES

- **Present Conditions** – The current dam provides complete protection from the 22-year, 24-hour event storm.
- **Alternative No. 1** - Downstream flooding and damages to property and infrastructure would increase. The City of Schertz and Bexar County would incur costs from repairing increased flood damages to bridges and roadways. The limits of the 100-year floodplain would increase, which would affect future development.
- **Alternative No. 2** - Same as Alternative No. 1
- **Alternative No. 3** - There would be continued protection from flooding. Threat of a catastrophic breach would be reduced due to FRS No. 6A's ability to endure the PMP without overtopping the dam.

THREATENED AND ENDANGERED (T&E) SPECIES

- **Present Conditions** - Current habitat is composed of an approximately 52-acre open water sediment pool, a 7.8-acre low quality forested wetland, a perennial stream, and low quality rangeland with invading brush species. There are no species listed as threatened or endangered by the USFWS or suitable habitat for listed species in or close to the proposed project site.
- **Alternative No. 1** - No Effect.
- **Alternative No. 2** - No Effect.
- **Alternative No. 3** - No Effect.

CULTURAL AND HISTORIC RESOURCES

- **Present Conditions** – No known cultural resources will be affected.
- **Alternative 1** - There would be potential to affect cultural resources (should any be present) in areas where earth fill from dam is placed and in areas of any necessary modifications to infrastructure downstream.
- **Alternative 2** - There would be potential to affect cultural resources (should any be present) in previously undisturbed areas where earth fill from dam is placed and in areas of any necessary modifications to infrastructure downstream.
- **Alternative 3** - NRCS has conducted a cultural resources survey of the proposed

rehabilitation work areas and no known cultural resources will be affected by this alternative. In the event of a discovery of a potential cultural resource during construction, all work will cease until a cultural resource specialist evaluates the site and recommends a course of action to be followed.

PRIME FARMLANDS

- **Present Conditions** – There is prime farmland located downstream in the project area but there will be no effect under present conditions. The Farmland Protection Policy Act (FPPA) of 1981, as amended, states in 7 CFR 658.2 “farmland does not include land already in or committed to urban development or water storage”.
- **Alternative 1** – No effect.
- **Alternative 2** – No effect.
- **Alternative 3** – Some of the proposed improvements (widening both auxiliary spillways 50 feet each) are in soils classified as Important Farmland and are subject to the FPPA. A composite rating for the soils in the proposed project impact area scored a total of 137 points in Part VII of the form AD-1006. The FPPA law states that sites that score less than 160 will need no further consideration; therefore the 7.2 acres affected is considered minimal.

WETLANDS

- **Present Conditions** - Approximately 7.8 acres of low quality palustrine forested wetlands are located at the upstream end of the 52-acre lake (sediment pool) of FRS No. 6A. This wetland provides habitat for reptiles, amphibians, waterfowl, and wading birds. Stream channels above and below the site are narrow with a perennial flow due to the effluent from an upstream wastewater treatment plant. There are no wetlands located below the dam in the project area.
- **Alternative No. 1** - This alternative would modify the 7.8-acre palustrine system that would be vegetated with native grasses and forbs indigenous to the Blackland prairie. SARA would be expected to meet minimum state standards in a least costly method to address wetland losses.
- **Alternative No. 2** - This alternative would modify the 7.8-acre palustrine system that would be vegetated with native grasses and forbs indigenous to the Blackland prairie. Riparian vegetation would be established through planting and natural regeneration. SARA would be responsible for any mitigation costs.
- **Alternative No. 3** - No impact.

AIR QUALITY

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

WATER QUALITY

- **Present Conditions** - No water quality problems have been specifically identified. Effluent from a wastewater treatment plant upstream of FRS No. 6A provides a continuous flow into the sediment pool. However, data on the quality of runoff in the sediment pool is limited. There is a potential of pollutants from the urbanized area being

carried in the runoff. Also, organic material and sediment deposited in the sediment pool affects the quality of the water.

- **Alternative No. 1** - Impacts will be of a temporary nature associated with earthmoving and other construction activities. Sediment in stream flow will be carried downstream.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - Impacts will be of a temporary nature associated with earthmoving and other construction activities. These conditions will only be present during construction activities and until the disturbed areas are re-vegetated. The Storm Water Pollution Prevention Plan (SWPPP) required under the Texas Pollutant Discharge Elimination System (TPDES) and the Texas Commission on Environmental Quality (TCEQ) Storm Water Construction General Permit would minimize any degradation of water quality during construction.

WATER QUANTITY

- **Present Conditions** – Although the stream is ephemeral, the sediment pool maintains a constant level of water due to continuous release of effluent from the wastewater treatment plant upstream.
- **Alternative No. 1** – During storm events, flood flows would move downstream adding to volume and peaks as it moves, thus increasing the floodplain to conditions existing prior to construction of the dam. Effluent flow would not be affected.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - During construction the sediment pool would be ineffective for a period of 2 to 3 months while the additional principal spillway outlet pipe is being installed. This condition will only be present until the lowest gated port in the existing principal spillway is closed following construction. During construction there would be a need to ensure that effluent flow from the wastewater treatment plant is unrestricted.

AESTHETICS

- **Present Conditions** – FRS No. 6A's sediment pool extends upstream up to and under Loop 1604. Area devoted to the detention pool extends for quite a distance upstream due to the flat topography. Although there is current and planned development upstream of FRS No. 6A, permanent water in the sediment pool is not visible from these areas. Accessibility to the sediment pool is limited to adjacent landowners. SARA owns land to the south of the sediment pool. Although land on the north side of the sediment pool is owned by a private landowner, it was determined that there is not much likelihood of development on the north side of the sediment pool due to limited accessibility of the property. For these reasons, aesthetics of the dam and sediment pool does not play a significant role in adjacent and upstream property values. The dam and auxiliary spillway areas are mowed frequently and maintained by SARA.
- **Alternative No. 1** – This alternative would leave a significant portion of the embankment in place. The material (about 20,000 cu yd) will be placed in the present easement area and vegetated for soil erosion control. The remaining portion of the embankment and the land currently covered by the sediment pool would be maintained as a greenbelt area.
- **Alternative No. 2** - This alternative would leave a significant portion of the embankment in place. Excavated material (about 20,000 cu yd) would be placed in the sediment and detention pool areas and all exposed areas would be vegetated as needed for erosion control (about 50 acres). The remaining portion of the embankment and land currently covered by the sediment pool would be maintained as a greenbelt area. Riparian vegetation would be established along the stream channel (about 12 acres). Channel work would be installed to reconnect the stream channel through the sediment pool.

- **Alternative No. 3** - The dam and auxiliary spillway areas would continue to be mowed and maintained by SARA. About 40 acres would be affected by construction activities. These acres would be reseeded to native or introduced species following construction.

SEDIMENTATION

- **Present Conditions** – Sedimentation of the reservoir was surveyed and more than 100 acre-feet of capacity remains. 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 the 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.

LAND VALUES

- **Present Conditions** – Land below the dam to I-10 is within the city limits of Schertz. This area is zoned industrial and general business. City officials project that this area will be developed within 10-20 years. Land below I-10 to Freudenburg Road is not incorporated (Bexar County), but could be developed for residential and commercial purposes within the next 15-20 year period. Because of the topography and limited accessibility of the land located upstream of the dam and sediment pool, future development of this area was not considered.
- **Alternative No. 1** – Any future development downstream would be altered to insure no development takes place within the enlarged 100-year floodplain. About 165 acres would be added to the modified 100-year floodplain. Since no inhabitable development could take place within the 100-year floodplain, the fair market value for this acreage would be affected negatively. Upstream land values would not be affected.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** - Since the 100-year floodplain would remain unchanged; land values within areas projected to be developed would not be affected.

FISH AND WILDLIFE HABITAT

- **Present Conditions** – FRS No. 6A provides approximately 52 acres of deep water and shallow water habitat with an associated stream complex and 7.8 acres of low quality forested wetland habitat. Land use adjacent to the structure is private undeveloped lands used primarily for livestock grazing and crop production. The land cover is predominantly poor condition rangeland with a predominance of vegetation that is limited to low quality annual and perennial cool and warm season grasses, forbs, and invading brush species. FRS No. 6A currently provides habitat for small mammals, neotropical songbirds, shore birds, various water fowl, and a variety of fish species. Various species of reptiles and amphibians also inhabit the project site.
- **Alternative No. 1** - This alternative would have adverse impacts to shore birds, migratory waterfowl, and fish species due to the removal of the sediment pool. Various reptiles, amphibians, and small mammals would be adversely impacted due to the conversion of the forested wetland to an upland habitat.
- **Alternative No. 2** - This alternative would have adverse impacts to shore birds, migratory waterfowl, and fish species due to the removal of the sediment pool. Various reptiles, amphibians, and small mammals would be adversely impacted due to the conversion of the forested wetland to an upland habitat. As riparian vegetation becomes established, habitat for song birds, some reptiles, and amphibians would improve. The

mesic environment preferred by many reptiles and amphibians would be reduced to that associated with the stream channel.

- **Alternative No. 3** - This alternative would have only minor temporary adverse impact to current fish and wildlife habitat. Temporary turbidity due to construction activities would impact fish and waterfowl habitat in the sediment pool during installation of the additional spillway. There would be no impact to the channel upstream or the palustrine wetland. Downstream flows during storm events would be increased with possible minor impacts to the channel below the dam.

RECREATION

- **Present Conditions** – Currently, a radio controlled airplane club leases some land from SARA that is adjacent to the southern part of the sediment pool (actually within the detention pool area). This area is very flat and provides an ideal “airfield” for model airplanes. Also, access to the sediment pool is allowed by the landowner located on the northern side of the sediment pool for fishing purposes. A conservative estimate for both of these activities is about 2,000 visitor days per year.
- **Alternative No. 1** - The radio controlled airplane club would continue to lease land from SARA. Fishing opportunities would be lost.
- **Alternative No. 2** - Same as Alternative No. 1.
- **Alternative No. 3** – Recreational opportunities would continue. Frequency and depth of flooding will remain unchanged in Converse City Park. Because of the faster draw-down time due to the additional principal spillway, debris clean-up after major storm events could be done sooner, thus allowing recreational opportunities to commence sooner, also.

CUMULATIVE IMPACTS

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

Outside actions in addition to those evaluated here are not known. Additional improvements to the dam, sediment pool, and auxiliary spillways are not planned at this time. The potential for upstream development may affect hydrology or hydraulics, but the type and extent are not known. Two NRCS floodwater retarding structures are located upstream of FRS No. 6A – FRS Nos. 4 and 5. FRS No. 5 was upgraded to a high hazard dam in 2005. There are plans for FRS No. 4 to be upgraded to a high hazard dam in 2006. These upgrades will further reduce the chance of catastrophic breach of either dam, thus providing a greater level of protection to FRS No. 6A.

Downstream land uses are anticipated to remain the same in the short term, but are projected to change within the next 20 years. According to TXDOT, there are no plans to modify Loop 1604 in the next 10 years. As such, cumulative effects as a result of the Rehabilitation Alternative No.3 are not anticipated.

CONTROVERSY

There are no known areas of controversy.

RISK & UNCERTAINTY

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

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

CONSULTATION & PUBLIC PARTICIPATION

PROJECT SPONSORS:

Sponsors of the original Martinez Creek Watershed project and of the FRS No. 6A rehabilitation project are SARA and the Alamo SWCD. SARA agreed to be the lead sponsor and to provide coordination of the project.

PLANNING TEAM:

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

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

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

PUBLIC PARTICIPATION:

A public meeting was held on August 29, 2005, to explain the Watershed Rehabilitation Program and to scope resource problems, issues, and concerns of local residents associated with the FRS No. 6A project area. Notice of the meeting was posted and published in the local newspaper. Invitations to participate in the public meeting were e-mailed to potentially affected landowners and interested parties around FRS No. 6A and reservoir area.

Potential alternative solutions to bring the Martinez Creek Watershed FRS No. 6A into compliance with current dam safety criteria were presented at the initial meeting. Through verbal and written comments, meeting participants provided input on issues and concerns to be considered in the planning process.

A second meeting with landowners and project sponsors was held on February 16, 2006, to summarize planning accomplishments, convey results of the reservoir sedimentation survey, and present various structural and non-structural alternatives.

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

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

PROVISIONS OF THE PREFERRED ALTERNATIVE

PREFERRED ALTERNATIVE

Alternative No. 3 is the preferred alternative. The dam will be modified to meet current performance and safety standards for a high hazard dam and extend the service life of FRS No. 6A for an additional 100 years. The modification will consist of rehabilitation of FRS No. 6A by raising the top of dam 3.1 feet with earth fill to elevation 634.2 and leaving the existing 3.5-foot by 11-foot by 11-foot drop inlet type principal spillway and connecting 42-inch pipe intact. A new 36-inch hooded inlet type principal spillway will be added at elevation 611.7 (elevation of existing low stage port) with an impact basin at the outlet. Release channels from both principal spillways will be connected. The existing auxiliary spillways will be widened 50 feet to accommodate the construction of splitter dikes. Due to updated future sediment rate predictions, 694 acre feet of volume originally dedicated to sediment reserve and aerated sediment storage will now be utilized exclusively for detention storage for the program life of the project. Estimated cost is \$1,627,100.

Construction activities will result in the disturbance of approximately 40 acres. The removal of vegetation will only be that necessary to allow rehabilitation of the structure. Disturbed areas will be reestablished to vegetation to reduce erosion that could occur due to soil disturbance.

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

RATIONALE FOR ALTERNATIVE PREFERENCE

Alternative plans were formulated as required by NRCS policy and "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (P&G) (USWRC, 1985). According to P&G, an alternative that reasonably maximizes net national economic development benefits is to be formulated. This alternative is to be identified as the National Economic Development (NED) Plan. Alternative No. 3 (Rehabilitation of FRS No. 6A) is the NED plan.

Alternative plans were formulated in consideration of the purposes of the project and concerns expressed during the public scoping process. Formulation of the alternative plans gave consideration to four criteria: completeness, effectiveness, efficiency, and acceptability. Alternative Nos. 1, 2, and 3 all meet the criteria for completeness. Alternative Nos. 1 and 2 remove the safety hazard of the dam from failing but they do not address the primary problem of assuring that downstream flood protection will continue to be provided.

Alternative No. 3 is the preferred alternative. It meets the purpose and need to maintain the present level of flood control benefits, comply with current performance and safety standards, and extends the service life of FRS No. 6A for an additional 100 years. It also produces the highest net monetary benefits and a local sponsor has agreed to fund the local share of the cost.

PURPOSE

The purposes of the FRS No. 6A rehabilitation project are to maintain the present level of flood control benefits, comply with the current performance and safety standards, and extend the service life of the structure for another 100 years.

MEASURES TO BE INSTALLED

The recommended plan consists of structural modifications to FRS No. 6A as follows:

- Raise top of dam elevation 3.1 feet from 631.1 feet to 634.2 by using earth fill.
- Install a new 36 inch hooded inlet type principal spillway at elevation 611.7 with an impact basin at outlet.
- Existing auxiliary spillways will be widened 50 feet to accommodate the construction of splitter dikes.
- Connect release channels of both principal spillways.

COMPARISON OF STRUCTURAL DATA

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

<i>Table G Comparison of Structural Data</i>				
FRS No. 6A	Unit	As Built ^{1/}	Existing Conditions ^{2/}	Planned
Surface Area (Principal Spillway Crest)	acres	58.1	52	52
Elevation, Top of Dam (effective)	Ft. MSL	631.1	631.1	634.2
Principal Spillway	type	Standard, 2 stage	Standard, 2 stage	Standard, 2 stage, plus hooded inlet
Length of Dam	Ft.	1,478'	1,478'	1,500'
Elevation, Principal Spillway Crest	Ft. MSL	617.5	617.5	617.5
Pipe Diameter, Principal Spillway	in	42"	42"	42" plus 36"
Auxiliary Spillways	type	Veg.	Veg.	Veg.
Elevation, Auxiliary Spillways	NAD27, ft MSL	625.8	625.8	625.8
Bottom Width, Auxiliary Spillways	Ft.	500' + 300'	500' + 300'	500' + 300'
Submerged Sediment Storage	acre-feet	793	688.1	95.1 ^{3/}
Aerated Sediment Storage	acre-feet	101	101	7.2 ^{4/}
Flood Storage	acre-feet	2076	1974.2	2661
Total Storage at Auxiliary Spillway Crest	acre-feet	2970	2763.3	2763.3

^{1/} As built data based on 1966 Record Drawings

^{2/} Existing conditions data based on 2005 survey data.

^{3/} 35.7 ac-ft needed for 100 yr. program life, 95.1 ac-ft available at elevation 611.7 (lowest ungated outlet)

^{4/} Needed for 100 year program life

PERMITS, COMPLIANCE AND REQUIREMENTS PRIOR TO CONSTRUCTION

Potential Permits Needed

Any discharge of dredged or fill material in a water of the US associated with rehabilitation of FRS No. 6A would require a Department of the Army permit under Section 404 of the Clean Water Act of 1972. It is likely that any such discharge would be authorized by a general permit such as Nationwide General Permit 3 for Maintenance.

For projects with disturbances equal to or greater than five acres it is necessary to have a Storm Water Pollution Prevention Plan (SWPPP) in place at least 48 hours prior to and during construction of the proposed project and filing a Notice of Intent with the TCEQ is required. A Notice of Termination (NOT) must be filed once the site has reached final stabilization. A copy of the Notice of Intent must be submitted by the construction site operator to the operator (City, County, etc.) of the storm sewer system that receives storm water runoff from the construction site.

Compliance with Local, State, and Federal Laws

All applicable local, state, and federal laws will be complied with in the installation of this project. Construction activities will require a (SWPPP). U.S. Army Corps of Engineers guidelines indicates that the project will require authorization under Section 404 of the Clean Water Act, and that the project will likely fall within the scope of an existing nationwide permit (NWP#3, Maintenance). Any applicable permits required by the U.S. Army Corps of Engineers will be obtained before any construction activities begin.

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

Operation and Maintenance

The project will be operated and maintained by the sponsors. SARA has the primary responsibilities for maintenance of FRS No. 6A. A new Operation and Maintenance (O&M) Agreement will be developed with SARA and the Alamo SWCD for FRS No. 6A for the 100-year program life of the structure. O&M activities include but are not limited to inspections, maintenance and repairs of the principal spillways, dam, vegetation and the auxiliary spillway. Based on data from SARA, it is estimated that O&M activities will cost about \$5,000 per year.

Memorandum of Understanding

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

Project Agreement

The Sponsors responsible for the 35 percent non-federal cost share (SARA) and the NRCS will enter into a Project Agreement in accordance with the National Contract Grants and Agreement Manual before any work is initiated by either the sponsor or the NRCS.

Emergency Action Plan

The sponsors will provide leadership in developing an Emergency Action Plan (EAP) prior to construction and will review and update the EAP annually with local emergency response officials. NRCS will provide technical assistance in preparation and updating of the EAP. The breach inundation map and data will be the basis for potential areas to be affected and citizens to be notified. The purpose of the EAP is to identify areas at risk, outline appropriate actions and to designate parties responsible for those actions in the event of a potential failure of FRS No. 6A.

COST, INSTALLATION AND FINANCING

The installation of the project will be financed jointly by SARA and the NRCS. NRCS will use funds appropriated for this purpose. The percentages of the eligible project costs including construction, engineering, project administration, and land rights to be paid by SARA and the NRCS are as follows:

	<u>SARA</u>	<u>NRCS</u>	<u>Estimated Project Cost</u>
Rehabilitation of FRS No.6A	35 %	65 %	\$1,358,900

An amount up to the percentage rate specified may be satisfied by SARA 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 (\$268,200) it incurs. However, these costs are not used in the calculation of the federal cost share. These costs are, however, included in the Estimated Installation Cost (Table 1, Appendix A). Also, costs of water, mineral and other resource rights, as well as federal, state and local permits are the responsibility of SARA and are not counted toward local cost share. See Table 2 in Appendix A for a complete distribution of total rehabilitation costs.

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. National Park Service, U. S. Department of the Interior. 2006. Native American Consultation Database.
4. Texas Historical Commission. 2006. Texas Archeological Sites Atlas. Martinez, Texas USGS Quad.
5. USDA Soil Conservation Service. August 1959. *Work Plan, Martinez Creek Watershed*.
6. USDA Soil Conservation Service. June 1991 Re-Issued. *Soil Survey, Bexar County Texas*.

LIST OF PREPARERS

Name & Present Title	Education	Experience (Years)
Steve Graham, P.E, Director Watershed Management, SARA	B.S. Civil Engineering	
Jim Blair, Flood Control Infrastructure Manager, SARA	B.S. Forestry	
Fernando Garza, District Conservationist, NRCS	B.S.	30
Steve Uselton, Soil Conservationist, NRCS	B.S. Agriculture Education	28
James Featherston, Agricultural Economist, NRCS	M.S. Agricultural Economics	29
Bryan Moffatt, Geologist, NRCS	B.S. Geology	25
Calvin Sanders, Cultural Resources Specialist, NRCS	M.A. Anthropology	23
Ronnie Skala, P. E. Hydraulic Engineer, NRCS	B.S. Agricultural Engineering	27
Russell Castro, Wildlife Biologist, NRCS	B.S. Wildlife Management	24
David Strakos, Civil Engineering Technician – NRCS	High School Diploma	28
Jim Kelly, Wildlife Biologist, NRCS	M.S. Forestry	5

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

STEERING COMMITTEE MEMBERS

NAME	ORGANIZATION	PHONE	EMAIL
Sam Carreon	City of San Antonio	210-207-8048	scarreon@sanantonio.gov
Tom Weaver	SARA – Board Member	210-658-6901	tqweaver@swbell.net
Aflon Schneider	Alamo Soil & Water Conservation District	210-658-2922	
Don Taylor	City of Schertz	210-658-7477	
John Bierschwale	City of Schertz	210-658-7477	
Leonard Truitt	City of Schertz	210-658-7477	
Sam Willoughby	City of Schertz	210-658-7477	
Nellie Shannon	TXDOT-SA	210-615-5804	mshanno@dot.state.tx.us
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William Burmeister	SARA	210-3206	wburmeister@sara-tx.org
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Nancy McBeth *	City of Schertz – City Planning	210-658-7477	nmcbeth@ci.schertz.tx.us
Amy Madison	City of Schertz – Econ. Development	210-658-7477	
Mike Herrera	City of San Antonio – City Planning	210-207-7873	
Dana Strange	Bexar County – Flood Control	210-335-0676	dstrange@bexar.org
Kerim Jacaman	Bexar County – Flood Control	210-335-0263	kjacaman@bexar.org

* Chairperson

APPENDICES

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

APPENDIX A

Tables 1-6

Table 1 - Estimated Installation Cost

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

Table 3 - Structural Data – Dams with Planned Storage Capacity

Table 4 - Estimated Average Annual NED Costs

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits

Table 6 - Comparison of NED Benefits and Costs

APPENDIX A

Table 1 - Estimated Installation Cost
FRS No. 6A
Martinez Creek Watershed, Texas
(Dollars) ^{1/}

Installation Cost Item	Unit	Number	Estimated Costs ^{2/}		
			Public Law 83-566 Funds	Other Funds	Total
Rehabilitation of FRS No. 6A	No.	1	\$1,151,500	\$475,600	\$1,627,100
Total Project			\$1,151,500	\$475,600	\$1,627,100

May/2006

^{1/} 2005 Prices.

^{2/} Federal Funds include NRCS Engineering and Project Administration (\$268,200), which are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Total Eligible Project Cost of \$1,358,900.

APPENDIX A

**Table 2 - Estimated Cost Distribution - Structural and Non-structural Measures
FRS No. 6A
Martinez Creek Watershed, Texas
(Dollars) ^{1/}**

	Installation Cost - Public Law 83-566 ^{2/}					Installation Cost - Other Funds				
	Construction	Engineering	Project Administration	Total PL 566	Construction	Engineering	Real Property Rights	Project Administration	Total Other	Total Installation Cost
Rehabilitation of FRS No. 6A	\$883,300	\$121,900	\$146,300	\$1,151,500	\$335,600	\$10,000	\$100,000	\$30,000	\$475,600	\$1,627,100
GRAND TOTAL	\$883,300	\$121,900	\$146,300	\$1,151,500	\$335,600	\$10,000	\$100,000	\$30,000	\$475,600	\$1,627,100

^{1/} 2005 Prices.

^{2/} Federal Engineering and Project Administration costs are not included when calculating eligible federal cost share. Therefore, federal cost share is based on Total Eligible Project Cost of \$1,358,900.

May/2006

APPENDIX A
Table 3 - Structural Data - Dams with Planned Storage Capacity
FRS No. 6A
Martinez Creek Watershed, Texas

Item	Unit	FRS No.6A
Class of structure		High
Seismic zone		0
Location	dec. deg.	Lat. 29.48, Long. -98.29
Uncontrolled drainage area	sq-mi	11.12
Controlled drainage area	sq-mi	5.12
Total drainage area	sq-mi	16.24
Runoff curve number (1-day) (Avg. AMC)		76
Time of concentration (T _c)	Hrs	1.7
Elevation top of dam	ft	634.2
Elevation crest of auxiliary spillway	ft	625.8
Elevation crest principal spillway	ft	617.5
Elevation sediment pool	ft	611.7
Maximum height of dam	ft	38
Volume of fill	yd ³	189,000 ^{1/}
Total capacity (auxiliary spillway crest)	ac-ft	2763.3
Sediment pool	ac-ft	95.1
Aerated sediment	ac-ft	7.2
Floodwater retarding pool	ac-ft	2661
Surface area		
Sediment pool	acres	52
Floodwater retarding pool	acres	376.8
Principal spillway		
Rainfall volume (1-day)	in	7.6
Rainfall volume (10-day)	in	12.7
Runoff volume (10-day)	in	5.5
Type - existing (standard drop inlet)		concrete
Diameter existing	in	42
Capacity existing	ft ³ /s	224
Type - secondary (hooded inlet)		concrete
Diameter hooded	in	36
Capacity hooded	ft ³ /s	147
Auxiliary spillway		
Vegetated		
Bottom width	ft	L=500' R=300'
Exit slope	%	L=4% R=5%
Frequency of operation	% chance	4.0 ^{2/}
Auxiliary spillway hydrograph		
Rainfall volume	in	13.2
Runoff volume	in	9.9
Storm duration	hrs	6
Velocity of flow (V _e)	ft/s	L=7.3 R=7.3
Maximum reservoir water surface elevation	ft	628.9
Freeboard hydrograph		
Rainfall volume	in	30.5
Runoff volume	in	26.8
Storm duration	hrs	6
Maximum reservoir water surface elevation	ft	634.2
Storage capacity equivalents		
Sediment volume	in	0.16
Floodwater retarding volume	in	4.49

^{1/} Total volume of fill in dam 189,000 yd³, volume of fill in the dam used in rehabilitation project 24,000 yd³ May/2006

^{2/} Variance to have a 25-year level of protection for the auxiliary spillways was verbally granted by national design engineer.

APPENDIX A
Table 4 - Estimated Average Annual NED Costs
FRS No. 6A
Martinez Creek Watershed, Texas
(Dollars) ^{1/}

Evaluation Unit	----- Project Outlays -----		Total
	Amortization of Installation Cost ^{2/}	Operation, Maintenance and Replacement Cost	
FRS No.6A	\$84,000	\$5,000	\$89,000
Grand Total	\$84,000	\$5,000	\$89,000

May/2006

^{1/} Price base 2005

^{2/} Amortized for 100 years at 5.125 percent

APPENDIX A

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits

FRS No. 6A

Martinez Creek Watershed, Texas

(Dollars) ^{1/}

Item	Estimated Average Annual Damages Without the Project ^{2/}	Estimated Average Annual Damages With the Project ^{2/}	Estimated Average Annual Benefits
Floodwater			
Crop and Pasture	\$32,900	\$25,900	\$7,000
Other Agricultural	\$20,400	\$14,500	\$5,900
Nonagricultural (Road and Bridge)	\$25,600	\$18,600	\$7,000
Subtotal	\$78,900	\$59,000	\$19,900
Sediment			
Overbank Deposition	\$1,200	\$900	\$300
Erosion			
Flood Plain Scour	\$5,100	\$4,000	\$1,100
Grand Total	\$85,200	\$63,900	\$21,300

May/2006

^{1/} Price Base: 2005 prices.

^{2/} Original downstream damages updated using applicable indices and updated data.

APPENDIX A
Table 6 - Comparison of NED Benefits and Costs
FRS No. 6A
 Martinez Creek Watershed, Texas
 (Dollars)^{1/}

Item	Average Annual Benefits				Average Annual Cost ^{3/}	Benefit/Cost Ratio
	Damage Reduction ^{2/}	Maintain Downstream Property Values	Maintain Incidental Recreation Benefits	Avoidance of Sponsor's Breach		
Rehabilitation of Floodwater Retarding Structure No. 6A	\$21,300	\$51,000	\$36,100	\$11,200	\$119,600	1.3:1.0

May/2006

^{1/} Price Base: 2005 prices
^{2/} From Table 5
^{3/} From Table 4

APPENDIX B

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



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>

May 10, 2006

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

Dear Dr. Butler:

On behalf of the Texas Agricultural Experiment Station, I have reviewed the Draft Plan Supplement and Environmental Assessment (EA) on the proposed rehabilitation of Floodwater Retarding Structure No. 6A of the Martinez Creek Watershed of the San Antonio River Watershed, Bexar County, Texas.

I have asked Dr. Allan Jones at the Texas Water Resources Institute to review the plans, and he has no comments or concerns regarding their analyses or recommendations.

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

Sincerely

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

EM/rp



Kathleen Hartnett White, *Chairman*
R. B. "Ralph" Marquez, *Commissioner*
Larry R. Soward, *Commissioner*
Glenn Shankle, *Executive Director*



FILE COPY

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Restoring and Preventing Pollution

May 25, 2006

A handwritten signature in black ink, appearing to read "Butler" with a stylized flourish below it.

Larry D. Butler, Ph.D.
State Conservationist
Natural Resources Conservation Service
101 South Main Street
Temple, TX 76501

Re: TCEQ Grant and Environmental Assessment Review System (GEARS) #7220, Natural Resources Conservation Service, Martinez Creek Watershed-Structure 6A

Dear Dr. Butler:

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

A review of the project for General Conformity impact in accordance with 40 CFR Part 93 and Title 30, Texas Administrative Code § 101.30 indicates that the proposed action is located in Bexar County, which is currently unclassified or in attainment of the National Ambient Air Quality Standards for all six criteria air pollutants. Therefore, general conformity does not apply.

Although any demolition, construction, rehabilitation or repair project will produce dust and particulate emissions, these actions should pose no significant impact upon air quality standards. Any minimal dust and particulate emissions should be easily controlled by the construction contractors using standard dust mitigation techniques.

We do not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities associated with it are completed in accordance with applicable local, state, and federal environmental permits and regulations. We recommend that the applicant take necessary steps to insure that best management practices are utilized to control runoff from construction sites to prevent detrimental impacts to surface and ground water.

It has been determined from a review of the information provided that an Application for TCEQ Approval of Floodplain Development Project need not be filed with TCEQ. Our records show that the community is a participant in the National Flood Insurance Program and as such has a Flood Hazard Prevention Ordinance / Court Order. Accordingly, care should be taken to ensure that the proposed construction takes into account the possible Flood Hazard Areas within the community's floodplains. Please notify the community floodplain administrator to ensure that all construction is in compliance with the community's Flood Hazard Prevention Ordinance / Court Order.

JUN 02 2006

Larry D. Butler, Ph.D.

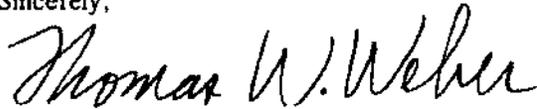
Page 2

May 25, 2006

Re: TCEQ Grant and Environmental Assessment Review System (GEARS) #7220, Natural Resources Conservation Service, Martinez Creek Watershed-Structure 6A

Thank you for the opportunity to review this project. If you have any questions, please call Ms. Betty Thompson at (512) 239-1627.

Sincerely,

A handwritten signature in black ink that reads "Thomas W. Weber". The signature is written in a cursive style with a large, prominent "T" and "W".

Thomas W. Weber, Manager
Water Programs, Chief Engineer's Office
Texas Commission on Environmental Quality



TEXAS STATE SOIL & WATER CONSERVATION BOARD

STATE HEADQUARTERS

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

9 May 06

FILE COPY

Bohnert
BB

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

Re: FRS 6A Martinez Creek Watershed

Dear Dr. Butler:

We have reviewed the Draft Plan Supplement and Environmental Assessment on the proposed rehabilitation of Floodwater Retarding Structure No. 6A 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.

cc. Rex Isom

MAY 12 2006

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

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

Texas Water Resources Institute

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

Response: Noted

Texas Commission on Environmental Quality

Comment: A review of the project for General Conformity impact in accordance with 40 CFR Part 93 and Title 30, Texas Administrative Code section 101.30 indicates that the proposed action is located in Bexar County, which is currently unclassified or in attainment of the National Ambient Air Quality Standards for all six criteria air pollutants. Therefore, general conformity does not apply.

Although any demolition, construction, rehabilitation or repair project will produce dust particulate emissions, these actions should pose no significant impact upon air quality standards. Any minimal dust and particulate emissions should be easily controlled by the construction contractors using standard dust mitigation techniques.

Response: Dust and particulate emissions during construction will be controlled.

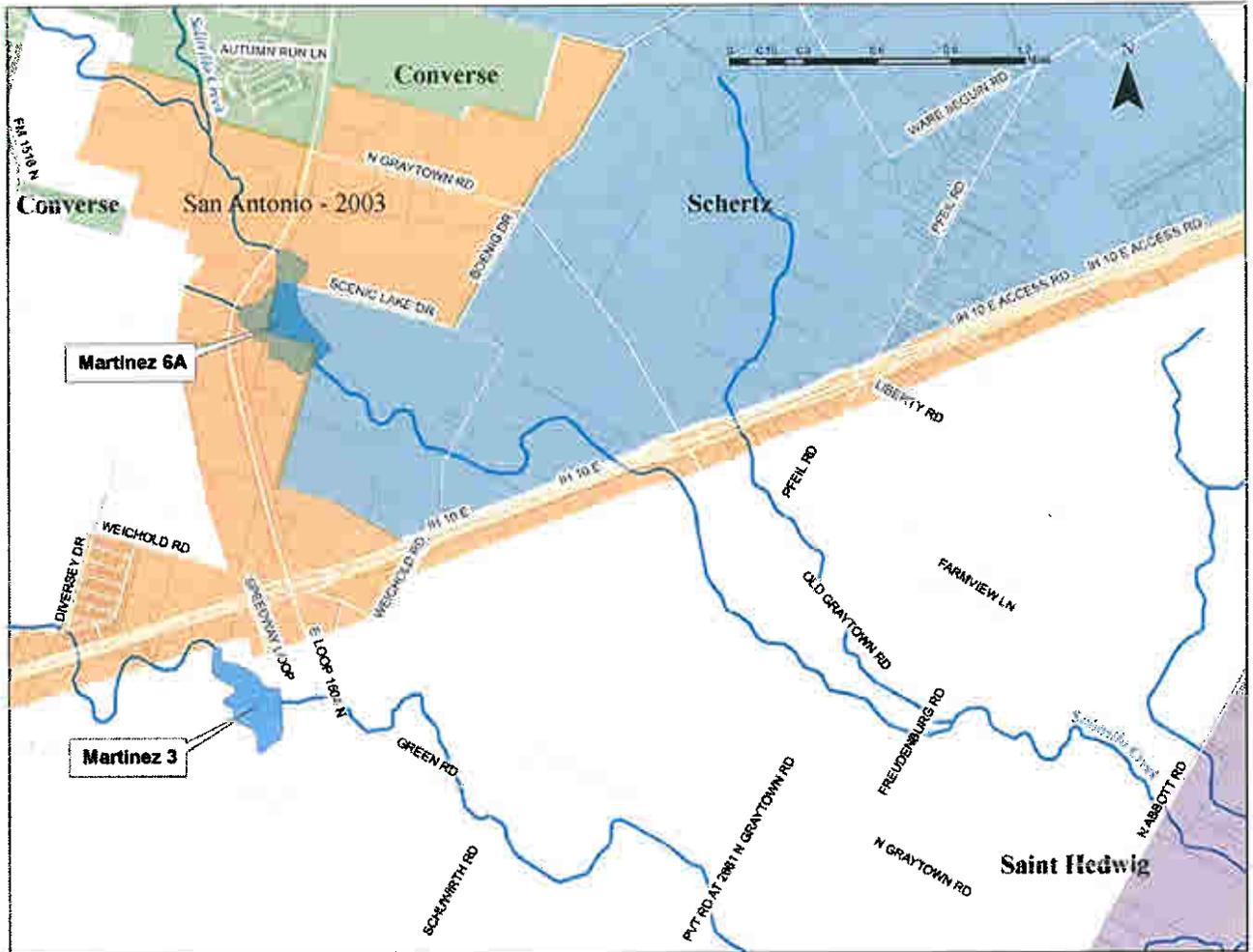
Texas State Soil & Water Conservation Board

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

Response: Noted

APPENDIX C

VICINITY MAP



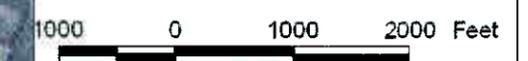
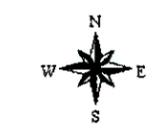


Martinez Creek Watershed
Site 6A
Breach Inundation Map

Section	Max Water Surface
1	608.1
2	604.5
3	596.9
4	593.8
5	589.6
6	583.8
7	579.9
8	576.2
9	571.9

Legend

-  Limits of Breach Flood
-  Cross Section



March 2006

APPENDIX D

Investigation and Analysis

Economics:

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

For flood damage reduction benefits, original damages with and without project were obtained from the 1958 work plan. Origins for these damages were compared with field notes of current land uses downstream of FRS No. 6A. Extent of damages was adjusted due to changes in land use. Adjusted damages were updated using appropriate indices (prices paid by producers, prices received by producers, consumer price index, and construction cost index). The difference in damages with and without project results in benefits. Based on this analysis, updated flood damage reduction benefits were estimated to be \$21,300 annually.

Concerning effects of the alternatives to downstream land values, future plans for development were obtained. City of Schertz officials and SARA's real estate specialists were asked to provide projections regarding future development downstream. Land below the dam to I-10 is within the city limits of Schertz. This area is zoned industrial and general business. City officials project that this area will be developed within 10-15 years. Land below I-10 to Freudenburg Road is not incorporated (Bexar County), but is expected to be developed for residential and commercial purposes within the next 15-20 year period. Under the Future Without Project (FWOP) alternative (sponsor's breach), any future development downstream would be altered to insure no development takes place within the enlarged 100-year floodplain. About 165 acres would be added to the modified 100-year floodplain (40 acres above and 125 acres below I-10). Since no inhabitable development could take place within the 100-year floodplain, the fair market value for this acreage would be affected negatively. Fair market land values currently average \$30,000 per acre. However, a net value of \$25,000 per acre was used in the analysis to account for remaining agricultural value (\$5,000 per acre) of the affected land. For land below the dam to I-10, land values were discounted for 10 years; from I-10 to Freudenburg Road, values were discounted for 20 years. Discounted values were then amortized over the program life (100 years) at 5.125%. Benefits accrued to the project by maintaining the current 100-year floodplain and allowing future development to occur. The difference between the values of the developable properties w/dam vs. the values of the developable properties w/o the dam is benefits, which were estimated to be \$51,000 annually. Because of the topography and limited accessibility of the land located upstream of the dam and sediment pool, future development of this area was not considered.

Incidental recreation benefits were based on current activities at FRS No. 6A. Currently, a radio controlled airplane club leases some land from SARA that is adjacent to the southern part of the sediment pool (actually within the detention pool area). This area is very flat and provides an ideal "airfield" for model airplanes. Also, access to the sediment pool is allowed by the landowner located on the northern side of the sediment pool for fishing purposes. A conservative estimate for both of these activities is about 2,000 visitor days per year. Using information from "Benefit Transfer of Outdoor Recreation Use Values: A Technical Document Supporting the Forest Service Strategic Plan" (2000 Revision), mean value of fishing (per person per day) for Southeast area studies was \$27.74. Under the FWOP alternative, the airplane club would still be able to use SARA's land for flying. However, fishing opportunities would cease,

resulting in a loss of 1,300 visitor days annually. This equates to a value of \$36,100 annually, which in turn would be maintained, and thus a benefit of rehabilitation of FRS No. 6A.

The cost of breaching the dam under the FWOP alternative was considered a cost avoided benefit for the Decommissioning and Rehabilitation Alternatives. A breach by the sponsors of FRS No. 6A was estimated to cost \$198,000. Amortizing this over 100 years at 5.125% results in an annual cost of \$11,200, which results in a cost savings (benefit).

Hydrology:

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

- The 25-year, 1-day Principal Spillway Hydrograph (PSH) storm event can not overtop the auxiliary spillway; and
- The PMP does not overtop the dam.

The design to meet these criteria required determining event flow rates for the watersheds above and immediately below the structure. This was accomplished by the use of a TR-20 model. Previously developed TR-20 models for Martinez Creek Watershed Site 4 and Site 5 were combined with a newly developed TR-20 model for Site 6A. The dam hydraulic and hydrologic site computer analysis program SITES was used to develop storage-discharge relationships, set the top of dam, auxiliary and principal spillway crests and conduit dimensions for the Site 6A rehabilitation alternatives. Simplified Dam Breach Routing Procedures (TR-66) were used to develop a breach hydrograph of Site 6A. Event flow rates from the TR-20 model and the breach hydrograph were used in a previously developed HEC-RAS model (provided by SARA) of Salitrillo Creek to define impacts and benefits associated with project alternatives. These models are available as part of the supporting documentation developed for this planning study.

The subtasks performed are summarized as follows:

- Assembly of existing relevant geographic information system (GIS) data into a project database;
- Delineation of the Martinez Creek Dams and Salitrillo Creek Watersheds
- Estimation of rainfall depths for event and design storms
- Estimation of watershed time of concentration, T_c
- Estimation and calibration of watershed curve numbers
- Estimation of channel loss factors
- Use SITES program to evaluate Site 6A rehabilitation alternatives
- Estimation of flow rates using the computer model TR-20
- Development of Site 6A breach hydrograph
- Estimation of downstream water surface elevations using the computer model HEC-RAS

Engineering:

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

- Maintain present level of flood control benefits.
- Comply with the current performance and safety standards. (Since it did not involve a safety issue, concurrence was acquired from the national design engineer to have a 25-year level of protection for the auxiliary spillways. A letter granting the variance will be obtained during design stage)
- Extend the service life of the structure.

The preferred alternative which best meets the purposes and need for the project is rehabilitation of the dam by construction of dam safety modifications developed to address dam safety deficiencies consistent with the dam's high hazard classification. Designed dam safety modifications include raising the dam 3.1 feet and adding an additional principal spillway hooded inlet with 36" conduit. Both of the auxiliary spillways will be widened approximately fifty feet to accommodate the installation of a splitter dike.

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

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

Environmental – Wetlands and Fish/Wildlife Habitat:

During the planning process an environmental evaluation was undertaken to determine what effects or consequences the selected alternatives would have on the environment around FRS No. 6A. Field investigations were conducted to gather on-site information that would aid in analyzing the alternatives. In addition, an NRCS team consisting of a soil scientist and two wildlife biologists conducted a wetland delineation at the FRS No. 6A site.

The wetland delineation process classified 7.8 acres at the upstream end of the sediment pool as low quality forested palustrine wetlands. Observations in the field support the determination that alternatives 1 and 2 would reduce the hydrology in the identified wetland and would result in the conversion of the 7.8 acres of forested wetland habitat to riparian habitat. Alternative 3 would increase the depth of inundation during storm events approaching the PMP and would have a minimal increase in the duration of inundation. Alternative 3 would not result in a significant change in soil moisture saturation or anaerobic conditions. It is the opinion of NRCS scientists that alternative 3 would have no effect on the wetlands adjacent to FRS No. 6A.

After observations in the field, NRCS biologists determined that best professional judgment was appropriate to make fish and wildlife habitat determinations. Alternatives 1 and 2 would involve converting open water habitat and wetlands to riverine and riparian habitats. Alternative 3 would not convert or have any effect on fish and wildlife habitat.

APPENDIX E

Consultation and Public Scoping Process

Summary of Consultation and Public Scoping Process

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

Original sponsors include SARA and the Alamo Soil and Water Conservation District. At the initiation of the planning process, meetings were held with representatives of the sponsors to ascertain their interest and concerns regarding the rehabilitation of FRS No. 6A of the Martinez Creek Watershed. The initial steering committee meeting was held on August 29, 2005, with sponsors, NRCS, and the invited public and steering committee present to discuss purposes and requirements of the rehabilitation program. Issues and concerns of the sponsors and an initial outline of the public scoping process were also reviewed. SARA agreed to serve as the "lead sponsor," being responsible for leading the planning process with assistance from NRCS. Meetings with the sponsors were held throughout the planning process. The sponsors provided coordination and representation at field reviews and public and other meetings. In addition, informal discussions amongst the sponsors, NRCS, and landowners were conducted throughout the entire planning period.

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

A second steering committee meeting was held on February 16, 2006 to review the results of the scoping process to date and to present potential alternative solutions to bring FRS No. 6A into compliance with current dam safety criteria. Through verbal and written comments, meeting participants provided input on issues and concerns to be considered in the planning process. Federal, State, and local agencies all participated in the scoping planning process.

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

The United States Fish and Wildlife Service web site was visited to obtain an official list of the federally-listed threatened and endangered species known to exist in Bexar County, Texas. The findings are shown in Table C found on page 11 of this document.

