Draft Supplemental Watershed Plan No. 6 and Environmental Assessment for Flood Water Retarding Structure No. 26 of the Big Sandy Creek Watershed Wise County, Texas

PREPARED BY

USDA Natural Resources Conservation Service

IN COOPERATION WITH

Wise Soil and Water Conservation District, Wise County Water Control and Improvement District No. 1, Wise County Commissioners Court. Upper Elm-Red Soil and Water Conservation District, Tarrant Regional Water District, Little Wichita Soil and Water Conservation District, Clay County Commissioners Court, Montague County Commissioners Court, City of Bowie, Texas

May 2024

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DRAFT Supplemental Watershed Plan & Environmental Assessment for the Rehabilitation of Floodwater Retarding Structure No. 26 of the Big Sandy Creek Watershed, Wise County, Texas

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

In Cooperation With:
Wise Soil and Water Conservation District, Wise County Water Control and Improvement District No. 1, Wise County Commissioners Court, Upper Elm-Red Soil and Water Conservation District, Tarrant Regional Water District, Little Wichita Soil and Water Conservation District, Clay County Commissioners Court, Montague County Commissioners Court, City of Bowie, Texas.

AUTHORITY

The original watershed work plan was prepared, and the works of improvement were installed, under the authority of the Watershed Protection and Flood Control Act of 1944 (Public Law 78-534) as amended. The rehabilitation of Big Sandy Creek Flood Retarding Structure No. 26 is authorized under Public Law 83-566 (as amended), as enacted by Section 313 or Public Law 106-472, otherwise known as "The Small Watershed Rehabilitation Amendments of 2000."

ABSTRACT

Big Sandy Creek Floodwater Retarding Structure No. 26 (FRS 26 or Big Sandy 26) was designed and constructed as a Class A, Low Hazard structure by the NRCS in the mid 1980's for the purpose of flood control as a measure included in the third supplemental watershed plan. Dam breach inundation analyses have revealed that FRS 26 is classified as a high hazard structure due to the expected loss of life resulting from catastrophic failure during the design storm event. In its current condition, FRS 26 does not meet Texas Commission on Environmental Quality (TCEQ) dam safety requirements or Natural Resources Conservation Service (NRCS) standards for high hazard dams. The FRS 26 project area is owned by Melton and Doris Neighbors (R000014951) and the United States Department of Agriculture - Forest Service (R000015019, LBJ National Grasslands). The non-compliance with Texas requirements for hydraulic capacity creates a need for action by the Sponsors. This Plan-EA describes the affected environment, identifies the affected environment, and describes the environmental consequences associated with each alternative. The preferred alternative involves structural rehabilitation of FRS 26 by widening the existing earthen auxiliary spillway channel, installing a filter drain and re-establishing the principal spillway's energy-dissipating structure. The Project Installation cost is estimated to be **$3,195,000**, of which **$2,065,300** will be paid from the Watershed Operations funds and **$1,129,700** from local funds.

COMMENTS AND INQUIRIES

For further information, please contact: Mark J. Northcut, Landscape Planning Leader,
USDA - Natural Resources Conservation Service, 101 South Main Street, Temple, Texas 76501,
Phone: (254) 742-9824.

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BIG SANDY CREEK WATERSHED AGREEMENT

Supplemental Watershed Plan Agreement
(Supplement No. 6)

Between the

Wise Soil and Water Conservation District, Wise County Water Control and Improvement District No. 1, Wise County Commissioners Court, Upper Elm-Red Soil and Water Conservation District, Tarrant Regional Water District, Little Wichita Soil and Water Conservation District, Clay County Commissioners Court, Montague County Commissioners Court, City of Bowie, Texas

(Referred to herein as "Sponsors" or "Sponsoring Local Organizations" or "SLOs")

and the

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
Formerly the Soil Conservation Service (SCS)
(Referred to herein as NRCS)

Whereas, the original Watershed Plan Agreement for the Big Sandy Creek watershed, State of Texas, executed by the Sponsors named therein and NRCS, became effective on January 18, 1956; and

Whereas, the Watershed Plan was amended by Supplemental Watershed Plan Agreements executed by the Sponsors and NRCS and became effective on December 13, 1971 (I), April 26, 1976 (II), August 22, 1979 (III), January 5, 2006 (IV), May 27, 2005 (V); and

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

Whereas, application has heretofore been made to the Secretary of Agriculture by the Sponsors for assistance in preparing a plan for works of improvement for Structure No. 26 in the Big Sandy Creek Watershed, State of Texas, under the authority of the Soil Conservation Act of 1935 (PL-46, 74th Congress), the Flood Control Act of June 22, 1936 (PL-738, 74th Congress), and the Flood Control Act of December 22, 1944 (PL-534, 78th Congress, 2nd Session); and

Whereas, there has been developed through the cooperative efforts of the Sponsors and NRCS a Watershed Work Plan No. 6 – Environmental Assessment for works of improvement for the restructuring of Structure No. 26, Big Sandy Creek Watershed, State of Texas, hereinafter referred to as the Plan-EA or plan, which plan is annexed to and made a part of this agreement;

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through NRCS, and the Sponsors hereby agree on this watershed project plan and that the works of

improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this plan and including the following:

1. **Term.** The term of this agreement is for the 3-year installation period and 100-year evaluated life of the project (103 years total) and does not commit NRCS to assistance of any kind beyond the end of the evaluated life.

2. **Costs.** The costs shown in this plan are preliminary estimates. Final costs to be borne by the parties hereto will be the actual costs incurred in the installation of works of improvement.

3. **Real property.** The sponsors will acquire such real property as will be needed in connection with the works of improvement. The amounts and percentages of the real property acquisition costs to be borne by the Sponsors and NRCS are as shown in the cost-share table in Section 5 hereof.

   The sponsors agree that all land acquired for measures, other than land treatment practices, with financial or credit assistance under this agreement will not be sold or otherwise disposed of for the evaluated life of the project except to a public agency which will continue to maintain and operate the development in accordance with the operation and maintenance agreement.

   The sponsors have current, original easements which lack specified flood easement elevation or surveyed structure extent. The broad wording of these easements will require greater definition by the Sponsors in order for the construction of the dam rehabilitation project to proceed. The recommended minimum easement elevation for FRS No. 26 is elevation 912.3 feet NAVD 88 (the original auxiliary spillway control section elevation plus two feet). The sponsors and the landowners acknowledge and accept the risks associated with allowing future construction to occur at elevations lower than the elevation of the Probable Maximum Flood. The Probable Maximum Flood peak water surface elevation is 913.3 feet NAVD 88. The area of upstream flooding in the proposed configuration at elevation 913.3 feet is approximately 57 acres.

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

5. **Cost-share for Watershed Project Plans.** The following table will be used to show cost-share percentages and amounts for watershed project plan implementation.

Works of Improvement	NRCS		Other		Total
	Percent	Cost	Percent	Cost	Cost
Cost-Sharable Items [1/]					
Construction: FRS 26 Spillway[2/]	66.8%	$1,574,800	33.2%	$782,690	$2,357,500
Subtotal - Cost Sharable Items – Flood Control	**66.8%**	**$1,574,800**	**33.2%**	**$782,690**	**$2,357,500**
Non Cost-Sharable Items[4/]					
Engineering[3/]	98%	$465,500	2%	$9,500	$475,000
Project Adminstration[5/]	N/A	$25,000	NA	$50,000	$75,000
Water, Mineral and Other Resource Rights	N/A	$0	N/A	$0	$0
Real Property Rights[6/]	0%	$0	100%	$187,500	$187,500
Permits	0%	$0	100%	$100,000	$100,000
Relocation, Beyond Required Decent, Safe, Sanitary	0%	$0	100%	$0	$0
Non-Project Costs	0%	$0	100%	$0	$0
Subtotal: Non Cost-Sharable Items	**60%**	**$500,000**	**40%**	**$337,500**	**$837,500**
TOTAL:	**65%**	**$2,065,300**	**35%**	**$1,129,700**	**$3,195,000**

1/ Price Base: 2023 Prepared: July 2023

2/Cost share is based on eligible cost sharable items and in-kind contributions, limited to 100% of the construction cost.

3/ Includes engineering costs associated with geotechnical exploration and testing, design of the new auxiliary spillway, archaeological survey, and environmental coordination.

4/ If actual costs incurred are greater than shown here, each party shall bear the responsibility for their costs.

5/ Includes costs associated with contract administration.

6/ Includes purchase of construction easement and permanent easements associated with the proposed auxiliary spillway.

7/ Investigation of the watershed project area indicates that no displacements will be involved under present conditions. However, in the event that displacement becomes necessary at a later data, the cost of relocation assistance and payments will be cost-shared in accordance with the percentages shown.

6. **Land treatment agreements.** The sponsors will obtain agreements from owners of not less than 50 percent of the land above each multiple-purpose and floodwater-retarding structure. These agreements must provide that the owners will carry out farm or ranch conservation plans on their land. The sponsors will ensure that 50 percent of the land upstream of any retention reservoir site is adequately protected before construction of the dam. The sponsors will assist landowners and operators to ensure the installation of the land treatment measures shown in the watershed project plan. The sponsors will encourage landowners and operators to continue to operate and maintain the land treatment measures after the long-term contracts expire, for the protection and improvement of the watershed.

7. **Floodplain Management.** Before construction of any project for flood prevention, the sponsors must agree to participate in and comply with applicable Federal floodplain management and flood insurance programs.

8. **Water and mineral rights.** The sponsors will acquire or provide assurance that landowners or resource users have acquired such water, mineral, or other natural resources rights pursuant to State law as may be needed in the installation and operation of the works of improvement. Any costs incurred must be borne by the sponsors and these costs are not eligible as part of the sponsors' cost-share.

9. **Permits.** The sponsors will obtain and bear the cost for all necessary Federal, State, and local permits required by law, ordinance, or regulation for installation of the works of improvement. These costs are not eligible as part of the sponsors' cost-share.

10. **NRCS assistance.** This agreement is not a fund-obligating document. Financial and other assistance to be furnished by NRCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

11. **Additional agreements**. A separate agreement will be entered into between NRCS and the sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

12. **Amendments.** This plan may be amended or revised only by mutual agreement of the parties hereto, except that NRCS may deauthorize or terminate funding at any time it determines that the sponsors have failed to comply with the conditions of this agreement or when the program funding or authority expires. In this case, NRCS must promptly notify the sponsors in writing of the determination and the reasons for the deauthorization of project funding, together with the effective date. Payments made to the sponsors or recoveries by NRCS must be in accordance with the legal rights and liabilities of the parties when project funding has been deauthorized. An amendment to incorporate changes affecting a specific measure may be made by mutual agreement between NRCS and the sponsors having specific responsibilities for the measure involved.

13. **Prohibitions.** No member of or delegate to Congress, or resident commissioner, may be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision may not be construed to extend to this agreement if made with a corporation for its general benefit.

14. **Operation and Maintenance (O&M).** The sponsors will be responsible for the operation, maintenance, and any needed replacement of the works of improvement by actually performing the work or arranging for such work, in accordance with an O&M Agreement. An O&M agreement will be entered into before Federal funds are obligated and will continue for the project life (100 years). Although the sponsors' responsibility to the Federal Government for O&M ends when the O&M agreement expires upon completion of the evaluated life of measures covered by the agreement, the sponsors acknowledge that continued liabilities and responsibilities associated with works of improvement may exist beyond the evaluated life.

15. **Emergency Action Plan.** Prior to construction, the sponsors must prepare an Emergency Action Plan (EAP) for the dam where failure may cause loss of life or as required by state and local regulations. The EAP must meet the minimum content specified in the NRCS Title 180, National Operation and Maintenance Manual (NOMM), Part 500, Subpart F, Section 500.52, and meet applicable State agency dam safety requirements. The NRCS will determine that an EAP is prepared prior to the execution of fund obligating documents for construction of the structure. EAPs must be reviewed and updated by the sponsors annually.

16. **Nondiscrimination Provisions**. In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

    Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English. To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.USDA is an equal opportunity provider, employer, and lender.

    By signing this agreement, the recipient assures the Department of Agriculture that the program or activities provided for under this agreement will be conducted in compliance with all applicable Federal civil rights laws, rules, regulations, and policies.

17. **Certification Regarding Drug-Free Workplace Requirements** (7 CFR Part 3021). By signing this Watershed Agreement, the sponsors are providing the certification set out below. If it is later determined that the sponsors knowingly rendered a false certification, or otherwise violated the requirements of the Drug-Free Workplace Act, the NRCS, in addition to any other remedies available to the Federal Government, may take action authorized under the Drug-Free Workplace Act.

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

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

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

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

Certification:

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

(1) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition.

(2) Establishing an ongoing drug-free awareness program to inform employees about—

(a) The danger of drug abuse in the workplace;

(b) The grantee's policy of maintaining a drug-free workplace;

(c) Any available drug counseling, rehabilitation, and employee assistance programs; and

(d) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

(3) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (1).

(4) Notifying the employee in the statement required by paragraph (1) that, as a condition of employment under the grant, the employee must—

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

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

(5) Notifying the NRCS in writing, within 10 calendar days after receiving notice under paragraph (4)(b) from an employee or otherwise receiving actual notice of such conviction. Employers of convicted employees must provide notice, including position title, to every grant officer or other designee on whose grant activity the

convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice must include the identification numbers of each affected grant.

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

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

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

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

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

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

18. Certification Regarding Lobbying (7 CFR Part 3018) (for projects > $100,000)

A. The sponsors certify to the best of their knowledge and belief, that:

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

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned must complete and submit Standard Form LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.

(3) The sponsors must require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients must certify and disclose accordingly.

B. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed

by U.S. Code, Title 31, Section 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

19. Certification Regarding Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions (7 CFR Part 3017).

A. The sponsors certify to the best of their knowledge and belief, that they and their principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

(2) Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses enumerated in paragraph A(2) of this certification; and

(4) Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State, or local) terminated for cause or default.

B. Where the primary sponsors are unable to certify to any of the statements in this certification, such prospective participant must attach an explanation to this agreement.

20. Clean Air and Water Certification.

A. The project sponsoring organizations signatory to this agreement certify as follows:

(1) Any facility to be utilized in the performance of this proposed agreement is not listed on the Environmental Protection Agency List of Violating Facilities.

(2) To promptly notify the NRCS-State administrative officer prior to the signing of this agreement by NRCS, of the receipt of any communication from the Director, Office of Federal Activities, U.S. Environmental Protection Agency, indicating that any facility which is proposed for use under this agreement is under consideration to be listed on the Environmental Protection Agency List of Violating Facilities.

(3) To include substantially this certification, including this subparagraph, in every nonexempt sub-agreement.

B. The project sponsoring organizations signatory to this agreement agrees as follows:

(1) To comply with all the requirements of section 114 of the Clean Air Act as amended (42 U.S.C. Section 7414) and section 308 of the Federal Water Pollution Control Act (33 U.S.C. Section 1318), respectively, relating to inspection, monitoring, entry, reports, and information, as well as other requirements specified in section

114 and section 308 of the Air Act and the Water Act, issued there under before the signing of this agreement by NRCS.

(2) That no portion of the work required by this agreement will be performed in facilities listed on the EPA List of Violating Facilities on the date when this agreement was signed by NRCS unless and until the EPA eliminates the name of such facility or facilities from such listing.

(3) To use their best efforts to comply with clean air standards and clean water standards at the facilities in which the agreement is being performed.

(4) To insert the substance of the provisions of this clause in any nonexempt subagreement.

C. The terms used in this clause have the following meanings:

(1) The term "Air Act" means the Clean Air Act, as amended (42 U.S.C. Section 7401 et seq.).

(2) The term "Water Act" means Federal Water Pollution Control Act, as amended (33 U.S.C. Section 1251 et seq.).

(3) The term "clean air standards" means any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, or other requirements which are contained in, issued under, or otherwise adopted pursuant to the Air Act or Executive Order 11738, an applicable implementation plan as described in section 110 of the Air Act (42 U.S.C. Section 7414) or an approved implementation procedure under section 112 of the Air Act (42 U.S.C. Section 7412).

(4) The term "clean water standards" means any enforceable limitation, control, condition, prohibition, standards, or other requirement which is promulgated pursuant to the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. Section 1342), or by a local government to assure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. Section 1317).

(5) The term "facility" means any building, plant, installation, structure, mine, vessel, or other floating craft, location or site of operations, owned, leased, or supervised by a sponsor, to be utilized in the performance of an agreement or subagreement. Where a location or site of operations contains or includes more than one building, plant, installation, or structure, the entire location will be deemed to be a facility except where the Director, Office of Federal Activities, Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

21. Assurances and Compliance. As a condition of the grant or cooperative agreement, the sponsors assure and certify that they are in compliance with and will comply in the course of the agreement with all applicable laws, regulations, Executive orders and other generally applicable requirements, including those set out below which are hereby incorporated in this agreement by reference, and such other statutory provisions as are specifically set forth herein.

State, Local, and Indian Tribal Governments: OMB Circular Nos. A-87, A-102, A-129, and A-133; and 7 CFR Parts 3015, 3016, 3017, 3018, 3021, and 3052.

Nonprofit Organizations, Hospitals, Institutions of Higher Learning: OMB Circular Nos. A-110, A-122, A-129, and A-133; and 7 CFR Parts 3015, 3017, 3018, 3019, 3021 and 3052.

22. **Examination of Records.** The sponsors must give the NRCS or the Comptroller General, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to this agreement, and retain all records related to this agreement for a period of three years after completion of the terms of this agreement in accordance with the applicable OMB Circular.

23. **Signatures**

Wise Soil and Water Conservation District - Sponsor
407 Park West Ct, Suite 200
Decatur, Texas 76234

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Wise Soil and Water Conservation District at a meeting held on_____.

_____
Administrative Secretary or Notary

Wise Soil and Water Conservation District
407 Park West Ct, Suite 200
Decatur, Texas 76234

Date: _____

Wise County Water Control and Improvement District No. 1 - Sponsor
1604 West Business 380
Decatur, Texas 76234

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Wise County Water Control and Improvement District No. 1 at a meeting held on _____.

_____
Administrative Secretary or Notary

Wise County Water Control and Improvement District No. 1
1604 West Business 380
Decatur, Texas 76234

Date: _____

Wise County Commissioners Court – Sponsor
PO Box 899
Decatur, Texas 76234

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Wise County Commissioners Court at a meeting held on _____.

_____
Administrative Secretary or Notary

Wise County Commissioners Court
PO Box 899
Decatur, Texas 76234

Date: _____

Upper Elm-Red Soil and Water Conservation District – Sponsor
2200 N. Grand Ave
Gainesville, Texas 76240

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Upper Elm-Red Soil and Water Conservation District at a meeting held on _____.

_____
Administrative Secretary or Notary

Date: _____

Upper Elm-Red Soil and Water Conservation District
2200 N. Grand Ave
Gainesville, Texas 76240

Tarrant Regional Water District - Sponsor
800 E. Northside Drive
Fort Worth, Texas 76102

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Tarrant Regional Water District at a meeting held on _____.

_____
Administrative Secretary or Notary

Date: _____

Tarrant Regional Water District
800 E. Northside Drive
Fort Worth, Texas 76102

Little Wichita Soil and Water

By: _____

Conservation District - Sponsor
4311 South 31st Street, Suite 125
Temple, Texas 76502
PO Box 658

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Little Wichita Soil and Water Conservation District at a meeting held on _____.

_____
Administrative Secretary or Notary

Date: _____

Little Wichita Soil and Water
Conservation District
4311 South 31st Street, Suite 125
Temple, Texas 76502
PO Box 658

Clay County Commissioners Court – Sponsor
214 N. Main Street
Henrietta, Texas 76365
PO Box 548

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Clay County Commissioners Court at a meeting held on _____.

_____
Administrative Secretary or Notary

Date: _____

Clay County Commissioners Court
214 N. Main Street
Henrietta, Texas 76365
PO Box 548

Montague County Commissioners Court – Sponsor
PO Box 416
Montague, Texas 76251

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the Montague County Commissioners Court at a meeting held on _____.

_____
Administrative Secretary or Notary

Montague County Commissioners Court
PO Box 416
Montague, Texas 76251

Date: _____

City of Bowie, Texas - Sponsor

304 N. Mason
Bowie, Texas 76230

By: _____

Title: _____

Date: _____

The signing of this supplemental watershed agreement was authorized by the governing body of the City of Bowie, Texas at a meeting held on _____.

_____
Administrative Secretary or Notary

City of Bowie, Texas
304 N. Mason
Bowie, Texas 76230

Date: _____

Natural Resources Conservation Service

U.S. Department of Agriculture

Approved by:

_____

Kristy Oates

State Conservationist

Date: _____

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SUMMARY (OFFICE OF MANAGEMENT AND BUDGET FACT SHEET)

SUPPLEMENTAL WATERSHED PLAN NO. 6 & ENVIRONMENTAL ASSESSMENT
for
Floodwater Retarding Structure No. 26
of The Big Sandy Creek Watershed
Wise County, Texas
13th Congressional District

Prepared By: U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)

Authority: The original watershed work plan was prepared, and the works of improvement were installed, under the authority of the Flood Control Act of 1944 (Public Law 78-534) as amended. The rehabilitation of floodwater retarding structure No. 26 is authorized under Public Law 83-566 as amended, and as further amended by Section 313 of Public Law 106-472.

Sponsors: The project sponsors are:

Wise Soil and Water Conservation District
Wise County Water Control and Improvement District No. 1
Wise County Commissioners Court
Upper Elm-Red Soil and Water Conservation District
Tarrant Regional Water District
Little Wichita Soil and Water Conservation District
Clay County Commissioners Court
Montague County Commissioners Court
City of Bowie, Texas

Hereinafter referred to as the "Sponsors, Sponsoring Local Organizations, or SLOs".

Proposed Action: The proposed action is the structural rehabilitation of Big Sandy Creek Floodwater Retarding Structure No. 26 (Big Sandy 26, FRS 26 or subject dam) to meet current NRCS and Texas Dam Safety standards for small, high hazard dams with a term of 103 years (3 years for design and installation, and a 100 year useful life).

Purpose and Need for Action: Big Sandy FRS 26 was constructed for the purpose of flood protection. FRS 26 was designed and constructed by the United States Department of Agriculture (USDA)'s Soil Conservation Service (SCS, now NRCS) in Big Sandy Creek's third watershed supplement. Measures described in the third watershed supplement included the addition of 56 floodwater retarding structures (including FRS 26), land treatment and critical area stabilization.

FRS 26 was designed as a low hazard structure in 1984. However, the dam is currently classified as high hazard based on current dam safety standards in Texas and the results of dam breach inundation analyses. The existing dam is hydraulically deficient and cannot safely pass the design flood event. As such, FRS 26 does not comply with Texas law for high hazard dams. The

inadequate spillway capacity could result in catastrophic failure during the design flood event and jeopardize human lives and property downstream. The Sponsors' need for action is to address FRS 26's non-compliance with Texas regulatory requirements for high hazard dams.

Description of the Preferred Alternative: Structural Rehabilitation of FRS 26. The structural measures for the high hazard rehabilitation consist of the following activities:

- Widen the vegetated earthen auxiliary spillway channel to a minimum of 250 feet.
- Raise the control section of the existing vegetated auxiliary spillway by approximately 0.7 feet with earth fill to elevation 911.0 feet.
- Install a graded aggregate filter drain at the toe of the maximum embankment section into the foundation.
- Raise the minimum crest of the embankment to elevation 914.0 feet.
- Construct a new energy dissipating structure at the outlet of the principal spillway conduit.
- Perform minor modifications to the principal spillway riser metalwork.

Net Economic Benefit:

The benefit to cost ratio associated with the preferred alternative is approximately 0.04. There are additional benefits associated with the preferred alternative, which include reducing the likelihood of a breach and catastrophic failure during the design flood event. The preferred alternative provides an additional $4,537 in average annual flood damage reduction benefits (based on amortization of the installation costs using a discount rate of 2.50% and a 100 year period of analysis).

If FRS 26 were decommissioned, an estimated $223,361 in average annual flood damage reduction benefits currently provided to the area of potential effect would be lost due to increased flooding during the frequency storm events.

Resource Information:

Latitude & Longitude: 33.362914 N, -97.680276 W

8-Digit Hydrological Unit Number: 12030101

Climate and Topography: In Wise County, Texas, which is in the Grand Prairie Physiographic Province, the average temperature is 52.5 degrees F in the winter and 76.3 degrees F in the summer. The last frost of spring normally occurs in the early April and the first frost in the fall occurs in late October. This provides a growing season of approximately 206 days. The average annual precipitation is about 34.8 inches. This precipitation is distributed through the year. The average total snowfall is 1 inch.

Drainage Area:

Watershed	Size (acres)	Percent of Total
Big Sandy Creek[1]	317,000	100.0
Big Sandy 26	435	0.14
1. SCS. (1955). "Work Plan for Big Sandy Creek Watershed," Temple, TX. Includes entire Big Sandy Creek watershed area.		

Land Use in FRS 26 Watershed:

	Current		Proposed Conditions[1]	
Land Use	Land Area (acres)	Percentage of Watershed	Land Area (acres)	Percentage of Watershed
Woodland	6.2	1.4%	6.2	1.4%
Brush	135.3	31.1%	135.3	31.1%
Water	19.9	4.6%	19.9	4.6%
Open Space	273.7	62.9%	273.7	62.9%
1. Development within basin not anticipated. Land use within Big Sandy 26 basin will not change as a result of rehabilitation measures.				

Land Ownership in FRS 26 Watershed:

	Private Land Ownership	Public Land Ownership
Upstream of Dam	68.9%	31.1%
Downstream of Dam[1]	90%	10%
1. Assumed percentages of properties impacted by the maximum water depth created downstream of the dam site during the 500-year storm, modeled without the dam.		

Population and Demographics: Historically, Alvord and Wise County have been rural in nature and relatively unaffected by growth in the Dallas-Fort Worth metropolitan area. However, within the last two years, the North Central Texas Council of Governments, the metropolitan planning organization for the region, has included the City and County as part of the metroplex. Accompanying this is an expectation of potential accelerated future growth. Although this may be the case, there are not currently any local or regional land use plans reflecting this expectation.[1] The regional transportation plan indicates relatively minor improvements in the Alvord area consisting of incremental improvements to roadway capacity. No new roadways or significant changes to existing roadways are identified. The Texas State Demographer's Office estimated a rate of population increase of less than 1 percent per year over the period 2010-2050.

According to the U.S. Census Bureau's American Community Survey, the population of Alvord is 1,351 and Wise County is 68,632 (U.S. Census Bureau 2020). Approximately 86 percent of individuals in Alvord are White, with individuals of multi-racial heritage comprising 7 percent of the population. For the County, approximately 79 percent of individuals are White, with 11 percent claiming multi-racial heritage. Twenty percent of Wise County and ten percent of Alvord claim Hispanic or Latino heritage.

[1] https://www.nctcog.org/regional-data/regional-data-center

The median age of the population of Alvord is 28.3 years, in contrast to the Wise County median of 38.6 years. There is a significantly higher proportion of the population 18 years old or less (29 percent) compared to Wise County or State of Texas, with percent populations under 18 years old of 24.7 and 25.8, respectively. Less than 10 percent of the Alvord population is over 65 years old, while in Wise County and the State, approximately 15 and 13 percent of the population is over 65 years old, respectively.

Approximately 34.2 percent of the residents in Wise County age 25 or older have a high school education or higher, while 41.4 percent of Alvord residents age 25 or older have a high school diploma. About 15.6 percent of Alvord residents have earned a bachelor's degree or higher, while 18.8 percent of Wise County residents 25 or older have a bachelor's degree or higher.

There are 516 Wise County residents who are 16 years of age or older and employed, according to the U.S. Census Bureau 2020. The local economy of Alvord is divided into five categories: private company workers (66.1%); self-employed in own incorporated business (2.7%); private not-for-profit (9.5%); local, state, and federal government (17.8%), and self-employed in own not incorporated business (3.9%). The civilian population over 16 is also divided into the following categories: management, business, science, and arts occupations (26.4%); service occupations (18.8%); sales and office occupations (23.2%); natural resources, construction, and maintenance occupations (14.9%); and production, transportation, and material moving occupations (16.7%).

According to the 2020 Census Bureau, the median household income estimated for Alvord was $60,469. This compares to $63,826 per year for the median household income calculated for Texas. The national figure for median household income per year estimated for the same period was $64,994.

According to the U.S. Census Bureau 2020 estimates, Alvord had 4.6 percent of the population citizens living below the poverty level. That compares to 14.2 percent for State and 12.8 percent for the Nation.

The U.S. Census Bureau 2020 estimates that there were 418 housing units within Alvord. Of the occupied housing units, 56.5 percent were owner-occupied and 29.4 percent renter-occupied. The remaining housing units were vacant.

Cultural Resources: To assess the cultural resources impacts on all action alternatives, the Sponsors commissioned a cultural resources literature review.

A constraints memorandum dated April 6, 2021 identified known cultural resources and previously conducted archeological surveys in the project study area. Part of the eastern portion of the study area was previously surveyed for the United States Forest Service in 2010. There are five state-recognized archeological sites within a kilometer the study area; none were recommended for NRHP listing. No sites have been documented within the project study area. Additionally, no potentially eligible historic structures or other cultural resources have been documented in or adjacent to the study area. Based on the constraints memo there is low potential to adversely impact historic properties. However, there is the potential for undocumented archeological sites to be buried within alluvial settings in the study area. The SHPO has recommended an archaeological survey be conducted within the project area prior to beginning construction. Tribal consultation was initiated on January 11, 2021and will be ongoing until Tribes and SHPO have had the

opportunity to concur with NRCS's final determination of eligibility and formal findings of effect (after final archaeological report).

Highly Erodible Cropland: No effects are anticipated.
Threatened and Endangered Species: The reservoir was reviewed for occurrence of federally protected species or habitat and reported occurrences of state protected species. The USFWS Environmental Conservation Online System (ECOS) Information for Planning and Consultation (IPaC) was queried for trust resources known or expected to near the project site. There are no records of federally protected species directly on the site, but the databases indicated the potential for protected species in the vicinity. There is also the potential for state protected species at or near the site.

The USFWS's Information, Planning and Conservation System (IPaC) lists a total of four threatened and endangered bird species that may occur in the vicinity of the reservoir, three of which only need to be considered for wind energy projects. The species with potential to be found at the project site is the whooping crane.

The existing dam already creates an impediment to fish and other aquatic species. The project will have negligible impact to fish and wildlife.

The Texas Parks and Wildlife (TPWD) database was accessed to evaluate potential state species of concern on all reservoir alternatives considered. TPWD's database reports the following occurrences of state-listed imperiled and vulnerable species within Wise County (but none confirmed at the project site): two amphibians, nine birds, one insect, eight mammals, three mollusks, six reptiles, and seven plants.

Alternative Plans Considered: The following alternatives to address the need for action were considered:

Alternative 1: *Future Without Federal Investment or FWOFI / NEPA No-Action:* This alternative is the true no-action alternative, where the current condition of the structure will remain for the evaluated period, with routine maintenance activities performed by the Sponsors. The FWOFI and the effects produced by the FWOFI will serve as the baseline for comparing all other action alternatives with respect to the relevant scoping concerns and the affected environment. For FRS 26, the no-action alternative results in the Sponsors continuing to operate a dam that does not meet standards for high hazard dams in Texas. Other dam safety issues identified during past visual inspections, assessments and analyses performed as part of this watershed supplement will remain unaddressed. The dam safety issues worsen over time, promoting other failure mechanisms for FRS 26. The design storm eventually occurs and the dam fails catastrophically, sending a floodwave downstream 3.5 miles to the confluence with Big Sandy Creek. Flooding throughout the City of Alvord, Texas of life, damage to structures, roadways and other property.

Alternative 2: *Decommissioning with Federal Assistance:* This alternative involves a controlled breach of FRS 26, removal of all appurtenant structures, and re-establishing the floodplain, stream, and other nearby areas to a condition similar to before FRS 26 was constructed in 1984. Decommissioning addresses the need for action by removing the dam from service thereby

eliminating the dam safety deficiency. However, the removal of FRS 26 results in significantly increased flooding downstream during a wide array of flood events. Alternative 2 is a Federally-assisted decommissioning project.

Alternative 3: *Rehabilitate to high hazard standards (Texas and NRCS standards) with Federal Assistance:* This alternative involves the structural rehabilitation of FRS 26 to meet Texas and NRCS standards for small, high hazard dams. This alternative generally involves a combination of modifying the existing auxiliary spillway, raising the low areas of the embankment crest slightly with earth fill, installing a graded-aggregate filter through the toe of the embankment, and re-constructing the principal spillway energy dissipating structure. Alternative 3 is a Federally-assisted project. Alternative 3 is the preferred alternative identified in this plan, because it addresses the Sponsors' need for action while continuing to fulfill its purpose of flood control.

Alternative 4: The Sponsors have indicated that their preferred plan is Alternative 3 – Rehabilitate to high hazard standards (Texas and NRCS standards) with federal assistance. However, if federal funds are not available, then the sponsors have indicated that they will rehabilitate the dam to meet Texas standards for high hazard dams. The measures are nearly identical to achieve compliance with both Texas and NRCS standards for high hazard dams. This is the probable plan if the responsible federal official finds no justification for expenditure of federal funds on this project. This alternative includes generally the same measures as Alternative 3.

Alternative 5: Modify the Dam to Reduce the Hazard Classification. FRS 26 is currently classified as a high hazard structure due to the consequences associated with an uncontrolled release of the reservoir during the design storm event. This alternative involves structural modification of the existing FRS 26 to reduce the maximum storage volume of the dam such that an uncontrolled release during the design storm event would result in a significant hazard classification under Texas law. The dam and spillway are currently capable of passing a storm event greater than 50 percent of the Probable Maximum Precipitation. However, after performing a variety of dam breach inundation analyses and subsequent review of the consequences associated with PMP breach events of FRS 26, it is unlikely that this can be accomplished without significant structural modification of the principal spillway riser and auxiliary spillway. Based on these factors, Alternative 5 was considered unfeasible and was not carried forward to detailed analysis.

Alternative 6: Floodproof Downstream Structures. In its current configuration, the design storm event with breach of FRS 26 will result in the inundation of approximately 61 residential structures, 6 commercial structures, a government structure, an agricultural structure, 7 roadways including U.S. 287, and the BNSF railroad. Additionally, significant uncertainty would remain if additional development within the area of potential effect occurs in the future and new hazards were constructed without appropriate flood protection measures, thus reverting FRS 26 back to high hazard. Based on the number of impacted structures associated with a PMP and breach event of FRS 26 and uncertainties surrounding future development within the area of potential effect, floodproofing the downstream hazards was considered unfeasible and was not carried forward to detailed analysis.

Project Costs (Dollars)[1/]

Item	Cost Allocation	Cost Sharing			
		Public Law 83-566	Percent (%)	SLOs	Percent (%)
Construction	$2,357,500	$1,574,810	65	$782,690	35
Engineering	$475,000	465,500	98	9,500	2
Real Property Rights	$187,500	$0	0	$187,500	100
Project Admin.	$75,000	$25,000	n/a	$50,000	n/a
Permits	$100,000	$0	0	$100,000	100
Total	**$3,195,000**	**$2,065,300**	--	**$1,129,700**	--

[1/] Price base: 2023 (Prepared: July 2023)
2/A contingency of 25% was applied to the construction costs and real property rights costs.

Project Benefits: The preferred alternative will provide $2,000 in average annual flood protection benefits.

The estimated annual benefit to cost ratio is near-zero (approximately 0.02).

Number of Direct Beneficiaries: The population at risk (PAR) is estimated to be on the order of 97. The area of potential effect includes 61 residential structures, six commercial structures, one government structure (a fire station), one agricultural structure, seven roadways, and the BNSF Railway.

Other Beneficial Effects:

- The action will bring FRS 26 into compliance with applicable Texas and NRCS requirements for high hazard dams.
- The action will reduce the number of residential structures impacted during the design flood event from 61 to 3; commercial structures from 6 to 0; government structures from 1 to 0; agricultural structures from 1 to 0; roadway impacts from 7 roads flooded to 4; and 1 Railway to 0.
- This modification will reduce the likelihood of a dam failure if the design storm occurs which will also reduce the likelihood of life loss during the design flood event.
- Reduces the threat of loss of access and loss of emergency services for downstream properties and property owners during the design flood event.
- Th existing FRS 26 provides $226,300 in average annual equivalent flood protection benefits when compared with the dam being decommissioned.

Funding Schedule: The most likely scenario is for the project to be implemented over three years including the design and construction.

Federal funds:

Year 1: $300,000 for engineering; $5,000 for project administration.
Year 2: $165,500 for engineering; $600,000 for construction; $10,000 for project administration.
Year 3: $974,800 for construction; $10,000 for project administration.

Non-Federal Funds:

Year 1: $9,500 for engineering; 20,000 for permits; $10,000 for project administration.
Year 2: $300,000 for construction; $187,500 for Real Property Rights; $15,000 for project administration; $80,000 for permits.
Year 3: $482,700 for construction; $25,000 for project administration,

Period of Analysis: 103 years (includes 1.5 year for design and 1.5 years for construction)

Affected Environment

Project Life: 100 years

Environmental Effects/Impacts of the Proposed Action (EcoSystem Services):

Ecosystem Services Item	Impacts of Preferred Alternative
Provisioning (tangible goods provided for direct human use and consumption)	
Food	Provides flood protection for approximately 10.7 acres of croplands within the area of potential effect.
Regulating (maintain world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe)	
Flood and Disease Control	The project will result in FRS 26 meeting applicable dam safety standards for high hazard dams in Texas. Will provide additional benefits by reducing the likelihood of a breach during the design storm event.
Supporting (underlying processes maintaining conditions for life on Earth)	
No relevant resource concerns identified	Not applicable.
Cultural (make the world a place in which people want to live)	
No relevant resource concerns identified	No known cultural resource concerns have been identified, Tribal consultation was initiated on January 11, 2021 and will be ongoing until Tribes and SHPO have had the opportunity to concur with NRCS's final determination of eligibility and formal

Ecosystem Services Item	Impacts of Preferred Alternative
	findings of effect (after final archaeological report). The draft archaeological report was submitted to NRCS and USFS on March 20, 2024. S106 consultation was completed following NRCS review of the archaeological report.

Environmental Effects/Impacts of the Proposed Action (Other Typical Scoping Concerns):

Resource	**Impact**
Land Use	No land use changes are anticipated for the preferred alternative.
Prime and Unique Farmlands	Marginal encroachment on prime farmland is anticipated at the toe of the embankment.
Air Quality	Temporary increase in particulate matter on site during construction. Effects are short-term – indirect, minor, and adverse impacts. These effects can be largely mitigated with erosion and sediment control during construction. No long-term effects.
Water Resources, Waters of the U.S.	Coordination with the USACE will be necessary due to work in close proximity to waters of the U.S. No long-term impacts are anticipated.
Floodplain Management	The structural rehabilitation will protect the floodplain against damage resulting from a catastrophic failure of FRS 26.
Streams, Lakes and Wetlands	Temporary impacts to the downstream tributary, FRS 26 reservoir and an estimated 2.44 acres of wetlands located around the reservoir are anticipated. Less than 0.1 acre of permanent wetlands disturbance is anticipated. The normal pool elevation of FRS 26 will not change. A wetlands
Forest Resources	No known timbering activities are occurring within the project area. Approximately ½-acre of trees will be removed during construction. Tree cutting/clearing will be conducted in consultation with relevant State and Federal agencies, and outside of the sensitive or vulnerable time periods for any species identified by said agencies.
Endangered and Threatened Plant Species	No effect. No threatened or endangered plant species were identified in the project area.
Invasive Plant Species	No effect. No invasive plant species have been identified in project area.
Ecologically Critical Areas	No ecologically critical areas were identified within the project area.

Resource	Impact
Fish and Wildlife Resources	The current lake level may be drained and maintained in a drained state during part of construction. Temporary impacts may occur. No long-term effects are anticipated.
Threatened and Endangered Animal Species	Potential for one threatened species (whooping crane) in the project area subject to short-term impacts during construction. No long-term effects.
State Species of Concern	No permanent effects are anticipated for the preferred alternative.
Migratory Birds, Golden Eagles, Bald Eagles	No additional permanent loss of habitat is expected from the proposed alternative. Construction activity may deter migratory birds from this area temporarily.
Invasive Animal Species	No effect. No invasive animal species have been identified in the project area.
Public Health and Safety	**The proposed alternative will result in improved public health and safety by greatly reducing the likelihood of a failure and breach during the design flood event.**
Environmental Justice	**No unfair** or disparate **treatment** to **disadvantaged communities will** result from **the proposed action.**
Scenic Beauty	**No effect.**
Cultural and Historic Properties	Section 106 Consultation is ongoing. No known historic properties have yet been identified, Tribal consultation is ongoing until Tribes have had the chance to concur with NRCS's final determination of eligibility and formal findings of effect (final archaeological report submitted to NRCS March 20, 2024).
Local and Regional Economy	**The rehabilitation will reduce the likelihood of a failure of FRS 26 during the design flood, which will support the local and regional economy by not impacting commuters and local roadways** during **a major hydrologic event.**
Recreation	**No effect.**
Park Lands	No effect.

Major Conclusions: The sole purpose of FRS 26 is flood control. The Sponsors' need for action is to address a dam safety deficiency associated with FRS 26. The preferred alternative will result in the Sponsors meeting requirements for high hazard dams in Texas. The proposed action will result in an estimated $2,000 in additional average annual flood protection benefits as compared with the existing condition. The selected alternative will reduce the likelihood of the dam overtopping and failing during the design flood event, which provides protection to approximately 58 residential structures, 6 commercial structures, 1 agricultural structure, 1 government structure, 4 roadways and the BNSF Railway. Unavoidable adverse effects would result from

implementation of the proposed action. These effects are anticipated to be short-term and minor overall. Most of the adverse impacts identified in the Plan-Environmental Assessment can be mitigated prior to and during construction.

Areas of Controversy: None.

Issues to be Resolved: None.

Evidence of Unusual Congressional or Local Interest: None.

Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes

CHANGES REQUIRING PREPARATION OF A SUPPLEMENT

This supplement specifically addresses Big Sandy Creek Floodwater Retarding Structure No. 26 (FRS 26, Big Sandy 26, or subject dam). The subject dam was constructed in 1984 to low hazard dam standards and is located on an unnamed tributary to Big Sandy Creek immediately northeast of the City of Alvord, Texas. Subsequent to dam construction using low hazard design standards, downstream development of habitable structures has occurred and/or new inundation mapping was performed which changed the dam's hazard classification to high hazard. As such, FRS 26 does not comply with Texas high hazard dam design standards per Texas Administrative Code TAC 299.15(a)(1)(A). Meeting those higher design standards may require a change to FRS 26, a major feature in the watershed. For these reasons, the dam does not meet the objectives of the Sponsors, which includes providing flood protection to downstream life and property and reducing the risk of loss of human life.

PURPOSE AND NEED FOR ACTION

Big Sandy FRS 26 was originally designed and constructed by the United States Department of Agriculture (USDA)'s Soil Conservation Service (SCS, now Natural Resources Conservation Service or NRCS) as part of several measures to provide flood attenuation, protect downstream life and property from flood damage, and reduce erosion in the central and lower reaches of the Big Sandy Creek watershed. Measures described in the third watershed supplement included the addition of 56 floodwater retarding structures (including FRS 26), land treatment and critical area stabilization. FRS 26 was classified as a low hazard structure in 1984 when it was constructed. Subsequent breach inundation analyses revealed that the subject dam has high hazard potential based on the high likelihood of multiple lives being lost during a breach event. The inadequate spillway capacity causes FRS 26 to be out of compliance with Texas dam safety laws for high hazard dams and increases the likelihood of a dam failure during the design storm event. The present need for action is to address FRS 26's non-compliance with Texas regulatory requirements for high hazard dams.

The Federal Objective, as set forth in the Water Resources Development Act of 2007, specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by: (1) seeking to maximize sustainable economic development; (2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and (3) protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems.

The Guiding Principles constitute the concepts that should be considered when analyzing Federal investments in water resources and the General Requirements are topics that agencies must consider when analyzing Federal investments in water resources. The following Principles constitute the overarching concepts the Federal government seeks to promote through Federal investments in water resources now and into the foreseeable future.

ORIGINAL PROJECT

The Big Sandy Creek Watershed was authorized under Public Law 78-534 and includes approximately 317,000 acres (495 square miles) located in the north central portion of Wise County, Texas. Big Sandy FRS 26 was included in Watershed Work Plan Supplement No. 3 adopted by the Soil Conservation Service (now NRCS) and the sponsors in August 1979. The sponsors for these improvements were Wise Soil and Water Conservation District, Wise County, and Water Control and Improvement District No. 1. The plan included a combination of land treatments and improvements that addressed soil and plant management, water conservation, and flood prevention. Structural measures for flood prevention consisted of channel improvements and fifty-six floodwater retarding structures. Big Sandy 26 captures the runoff from approximately 435 acres, or 0.1 percent of the entire Big Sandy watershed. No interdependencies exist between the FRS 26 and the other measures described in the previous watershed supplements.

Big Sandy 26 was designed in 1983 and construction was completed in 1984 as a low hazard dam (per Work Plan Supplement No. 3). The structure is located in Wise County, Texas on an unnamed tributary to Big Sandy Creek approximately 3.4 river miles upstream of the confluence with Big Sandy Creek. The predominant land use of the watershed for this structure was historically a combination of agriculture and woodlands which generally remains unchanged today, although some development has occurred downstream of the structure. The Operation and Maintenance Agreement between the Sponsors and the NRCS was signed on January 2, 1979.

Big Sandy FRS 26 is a zoned earthen embankment approximately 34 feet in height with a drainage area of 435 acres (0.68 square miles). The surface area at normal pool elevation 904.7 feet (NAVD 88) is approximately 18.7 acres. The maximum surface area of impounded water at the crest of the existing dam is approximately 57.1 acres. According to Sheet 2 of the 1984 Record Drawings, the design submerged sediment capacity of FRS 26 was 90 acre-feet at the principal spillway crest elevation, the flood pool storage was 123 acre-feet, and the maximum storage volume was 255 acre-feet. The principal spillway consists of a reinforced-concrete riser structure and 24-inch diameter outlet conduit. The riser is a standard covered riser with inside plan dimensions of 6 feet by 2 feet with a 6-inch by 6-inch orifice which controls the normal pool elevation of the impoundment at normal pool elevation 904.7 feet. The high stage of the riser provides 12 feet of weir length at elevation 907.5 feet. The principal spillway conduit is a 24-inch diameter prestressed concrete cylinder pipe (AWWA C-301). Seven anti-seep collars were installed along the principal spillway conduit. No internal filter drain system exists in FRS 26's current condition. A 50-foot wide vegetated earthen auxiliary spillway is located in the left abutment of the structure. Flood discharges conveyed through this channel are controlled by a 50-foot long control section (upstream to downstream) at elevation 910.3 feet.

WATERSHED PROBLEMS AND OPPORTUNITIES

Sponsor Concerns: FRS 26 in its current configuration does not meet dam safety requirements for high hazard dams in Texas with regard to spillway capacity, nor does it meet NRCS requirements per Technical Release 210-60. These unmet performance standards create an increased risk to downstream life and property if FRS 26 experienced the design flood event. The non-compliance with Texas regulations and hydraulic performance creates a need for action by the Sponsors.

Soil Erodibility: Although the vegetated auxiliary spillway has performed satisfactorily since the construction of the dam, the auxiliary spillway does not meet the current criteria for capacity. Further analysis indicates that the topsoil materials in the auxiliary spillway may be vulnerable to erosion during the Spillway Design Hydrograph (SDH), however additional assessment is recommended during the design phase. Schnabel's SITES spillway integrity analysis indicates that the auxiliary spillway is not anticipated to breach during the Freeboard Hydrograph (FBH), but it lacks the hydraulic capacity to pass the design flood event without FRS 26 overtopping.

Floodplain Management: FRS 26 currently provides flood damage reduction to several downstream properties including 61 residential structures, 6 commercial structures,1 government structure (a fire station), 1 agricultural structure, seven roadways including U.S. 287, and the BNSF Railway (These are the structures located within the Existing conditions, 2-hour, 75% Local Texas PMP with breach event). The existing structure provides an estimated $224,300 in average annual flood protection benefits as compared with the dam being decommissioned. However, structures within the floodplain are vulnerable to flooding if the design flood occurs and causes a catastrophic failure of FRS 26 due to overtopping.

Erosion and Sedimentation: As of 2020, the subject reservoir, impounded in 1984, had reached 36 years (36 percent) of its planned 100-year service life. As designed, the submerged sediment capacity was 90 acre-feet. A bathymetric survey performed by JQ infrastructure in 2020 indicated that the submerged sediment capacity below normal pool elevation 904.7 feet was approximately 97.4 acre-feet. This result indicates that the existing submerged sediment yield has likely been negligible, since the survey results indicate an increase in available submerged sediment capacity. The difference is largely attributed to minor differences in survey measurements obtained in the 1980's versus the 2020 survey.

Watershed Opportunities

The following is a general list of opportunities that will be recognized through the implementation of this Plan. Quantification of these opportunities will be provided in other sections of this plan, if applicable.

- Achieve compliance with dam safety and performance standards established by NRCS and TCEQ for high hazard dams.
- Improve spillway capacity to reduce the likelihood of embankment overtopping and catastrophic failure during the design storm event.
- Reduce the sponsors' liability associated with operation of a non-compliant high hazard potential dam.
- Continue to provide sediment retention and reduce sediment deposition in the downstream floodways.

SCOPE OF THE ENVIRONMENTAL ASSESSMENT

A scoping process was used to identify issues of economic, environmental, cultural, and social importance in the watershed. Watershed concerns of Sponsors, technical agencies, and local citizens were expressed in meetings, including a public scoping meeting. An interdisciplinary planning team composed of the following areas of expertise identified factors that would affect soil, water, air, plant, animals, and human resources: engineering, biology, economics, resource conservation, water quality, soils, archaeology, and geology.

The Sponsors place a high priority on keeping the public informed on its operations and to invite public input on this project. On January 14, 2021, the Sponsors held a virtual (online) public meeting to present and discuss the scoping and overall objectives of this planning study. In addition to public attendance, representatives of regulatory agencies, permitting authorities and other government entities were invited to participate and share potential concerns with the overall project. The meeting was audio and video recorded. Four public comments were received during the meeting, and none were received from the public after the meeting. Three comments were made from the USDA Forest Service, regarding 1) parcel information for the downstream population, 2) the extent of stream restoration involved in the project, and 3) continuing to be apprised of the progress of the project. One representative of Wise County asked for clarification on which agencies were the local sponsors of the project. Table A lists specific ecosystem services concerns relevant to the project and rationales for their relevance or irrelevance to the project. Table B lists other typical scoping concerns and rationales for their relevance or irrelevance to the project. Unless the scoping concern was specifically stated during a public meeting or provided by a stakeholder or by NRCS, the relevance to the proposed action and rationale for each item has evolved as the plan development progressed.

Table A – Ecosystem Services Scoping Summary

Ecosystem Services	Relevant to the Proposed Action		Rationale
	Yes	No	
Provisioning (tangible goods provided for direct human use and consumption)			
Food	X		Approximately 10.6 acres of cropland are protected by the dam.
Fiber		X	Not applicable to proposed project.
Water		X	Not applicable to proposed project.
Timber		X	Not applicable to proposed project.
Biomass		X	Not applicable to proposed project.
Regulating (maintain world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe)			
Flood and Disease Control	X		The project purpose is flood control. The need for action is a result of insufficient spillway capacity, which would result in downstream flooding and loss of life if the dam failed during the design storm event.
Water Filtration		X	Not applicable to proposed project.
Climate Stabilization		X	The project has no meaningful impact to or effects on climate change.
Crop Pollination		X	Not applicable to proposed project.
Supporting (underlying processes maintaining conditions for life on Earth)			

Ecosystem Services	Relevant to the Proposed Action		Rationale
Nutrient Cycling	X		Maintain erosion and sediment control benefits.
Soil Formation		X	
Primary Production		X	No significant downstream croplands observed within the breach zone.
Cultural (make the world a place in which people want to live)			
Recreational Use		X	Not applicable to proposed project.
Spiritual		X	No known spiritual sites are located within the project limits. Tribal consultation is ongoing and will confirm this.
Aesthetic Viewsheds		X	Not applicable to proposed project.
Tribal Values		X	NRCS initiated consultation with Federally Recognized Tribes per S106 on January 11, 2021. As of July 12, 2023, there have been no responses from Tribes. The archaeological field investigation resulted in no new artifacts or historic sites. No effects to tribal values are anticipated. NRCS will wrap up S106 consultation following receipt of the archaeological report March 20, 2024.

Table B – Other Typical Scoping Concerns Identified for FRS 26, Wise County, Texas

Item/Concern	Relevant to the Proposed Action		Rationale
	Yes	No	
SOILS			
Land Use	X		Land uses not anticipated to change as a result of the dam rehabilitation, but will be considered during the design process.
Soil Resources		X	Soils are present, but project is not anticipated to significantly change soils on site.
Prime and Unique Farmland and farmland of statewide significance	X		Farmland Protection Policy Act. Approximately 10.6 acres of cropland are located in downstream areas. <1 acre of prime or unique farmland is present in the project area.
WATER			
Sole Source Aquifers		X	None present
Water Resources, Water of U.S.	X		Water of U.S. – USACE Jurisdiction
Water Quality		X	Project has sole purpose of flood control. Water quality is not relevant to the proposed action.
Regional Water Mgt. Plans		X	None known.
Floodplain Management	X		Executive Order 11988. The existing dam is a structural floodplain management measure with direct and measurable effects on floodplain management.
Streams, Lakes, and Wetlands	X		Executive Order 11990. Project involves an existing Lake. Work may be required near stream, lake and/or wetland resources.
Wild and Scenic Rivers		X	Federal Designation, none are located in the project area or anticipated to be impacted
AIR			
Air Quality	X		Clean Air Act, Federal Law. Land disturbing activities could have an effect on air quality.
PLANTS			

Item/Concern	Relevant to the Proposed Action		Rationale
	Yes	No	
Forest Resources	X		LBJ National Grasslands are present within the project area. No known timbering activities are occurring or impacted by this project.
Natural Areas		X	Present, but resources captured under other items/concern categories
Endangered and Threatened Species	X		Endangered Species Act, Federal Law. No endangered or threatened plant species have been identified in the project area
Invasive Species	X		Executive Order 13112, none known or identified on site
Riparian areas		X	Present, but resources captured under other items/concern categories
Ecologically Critical Areas	X		None known, but will consult with State and Federal agencies
ANIMALS			
Fish and wildlife resources	X		Site work on dam, impoundment, and in upland areas could temporarily impact fish and wildlife.
Essential Fish Habitat		X	Magnuson-Stevens Fishery Conservation and Management Act (50 CFR – Subpart J) is not applicable to this watershed
Coral Reefs		X	No coral reefs are present in the area of potential effect.
Endangered and Threatened Species	X		Endangered Species Act, Federal Law (Pelto – possible state-listed species in area, Whooping Crane)
Invasive Species		X	No known invasive animal species present
Migratory birds/Bald eagles/Golden eagles	X		Migratory Treaty Act, Federal Law. No known nesting sites within the project area
HUMANS			
Public Health and Safety	X		Dam provides flood protection for 61 residences, 6 commercial structures, 1 government structure (a fire station), 1 agricultural structure, 7 roadways including U.S. 287 and 6 local roadways, and the BNSF Railway
Scenic Beauty	X		Dam and impoundment visible to public and adjacent residents
Scientific Resources		X	No current studies or research being conducted in watershed or anticipated to be impacted
Social/Cultural Issues	X		The National Historic Preservation Act, Federal Law, 36 CFR Part 800
Historic Properties	X		The National Historic Preservation Act, Federal Law, 36 CFR Part 800. No historic properties were located within the project area. An archaeological survey was recommended by the SHPO and Section 106 consultation is ongoing.
Environmental Justice and Civil Rights		X	Executive Order 12898, no known controversy areas or disproportionately disadvantaged community impacts identified.
Local and Regional Economy	X		Seven downstream roadways are within the area of potential impact, including State Highway 287. A segment of the BNSF railroad is located within the area of potential impact. Several businesses located in the City of Alvord are located within the area of potential impact.
Recreation	X		Impoundment is located primarily on private property. Project Area not known to be actively used for recreation. Portions of the project area located within the LBJ National Grasslands.
Park Lands	X		State or Federal Designated Areas, adjacent to LBJ National Grasslands and portions of the project area are located within the LBJ National Grasslands.

AFFECTED ENVIRONMENT

PLANNING ACTIVITIES

As part of the planning activities, consultants reviewed available records for the existing FRS26, including record drawings, dam inventory information, record drawings, geotechnical reports and analyses, hydrologic and hydraulic data, past watershed supplements, data associated with Wise County and Alvord, Texas and other relevant information.

The planning activities included the gathering of relevant resource data. A public meeting was conducted on January 14, 2021 to solicit feedback from the project stakeholders regarding concerns with the watershed or the project. Environmental assessments were conducted to identify potential concerns in the project area and considerations for the design and construction phases of the project to reduce impacts. A cultural resource review was conducted to identify the presence of historic structures in the project area and identify if further investigation is warranted. Breach inundation analyses and frequency storm flood routings were performed to identify the population at risk and provide and inventory of structures that a located within the area of potential affect. The results of these studies and other available reports and data formed the basis for the affected environment. The affected environment was used as the basis to compare relevant resource tradeoffs between the alternatives.

PHYSICAL FEATURES

Project Location: The reservoir site, which includes all alternatives, is in the Big Sandy Creek Watershed portion of Wise County, Texas. Big Sandy 26 is located approximately 0.2 miles northeast of Alvord, Texas. The site is generally bounded by County Road 2690 to the west, Gossett-Foster Road to the north and Beyette Street to the south.

Topography: Topography within the Big Sandy Creek watershed, as indicated on the Alvord USGS 7.5-minute topographic quadrangle, is characterized by gently to strongly rolling hills with numerous drainage basins that flow in a generally south-southeast direction, terminating in the Trinity River. The watershed belongs to the Western Cross Timbers region, where the original vegetation of the area consists mainly of post oak-blackjack oak woodlands, with various other oaks, ash, cedar, sumac, and others. Much of the watershed has been converted to cattle pasture, and the USDA Forest Service administers many thousands of acres of the watershed. Trinity Group and Antlers Formation sandstone and limestone exposures dominate areas of the landscape and are the parent materials of much of the region's soils.

FRS 26 is in a similar topographic setting as described by the overall watershed. Much of FRS 26's watershed is pasture with some lightly forested areas and open space. FRS 26 discharges into an unnamed tributary to Big Sandy Creek. The confluence of the tributary with Big Sandy Creek is located approximately 3.4 river miles downstream of FRS 26 in a generally west-southwest direction. The FRS 26 watershed consists of predominantly forested, moderate-to-severe slopes with numerous small drainages that flow generally south-southwest toward Big Sandy Creek.

Project Area: The project area consists of FRS 26 and its associated impoundment, embankment, and auxiliary spillway. FRS 26 has a normal pool elevation of approximately 904.7 feet. FRS

26has a watershed area on the order of 435 acres (0.68 square miles). The majority of the project area is located on the property of Melton and Dorris Neighbors. During the development of this plan, a new parcel was sub-divided and a home constructed at the existing site access gate and right abutment of the dam. The construction of the property was unknown to the planning team until 2022 and the presence of the home has been incorporated into the affected environment and alternatives formulation. Portions of the original project's auxiliary spillway approach channel are located within the LBJ National Grasslands.

The area of potential effect is located within the downstream breach inundation zone and includes approximately 61 residences, six commercial structures, 1 government structure (fire department), 1 agricultural structure and seven roadways including U.S. 287 and the BNSF Railway.

Climate: Wise County has a humid subtropical climate with mild winters and hot, humid summers. The average annual temperature is 64.9ºF and average annual rainfall is 34.8".

Extreme weather events are often associated with intense thunderstorms, which can drop several inches of rain over a relatively short duration of time. Hurricanes, tropical storms, and tropical depressions can occasionally reach, or influence, the weather in north Texas. The Texas Commission on Environmental Quality's (TCEQ)'s statewide Probable Maximum Precipitation (PMP) study and methods for hydrologic and hydraulic analyses were used to estimate rainfall conditions for Probable Maximum Precipitation (PMP) analyses.

LAND USE

Based on the Existing Land Use Map for Wise County, agriculture/forestry are currently the predominant land uses within the watershed for the subject project site. Wise County does not currently have a comprehensive development plan available. Table C presents the estimated acreages and percentages of land use categories for Wise County.

Table C – Existing Land Use within Wise County, Texas

Existing Land Cover Type	*Total Area (acres)*	*Percent of County Area (%)*
Open Water	14,885.39	2.52
Developed, Open Space	23,946.20	4.06
Developed, Low Intensity	13,532.20	2.29
Developed, Medium Intensity	4,783.39	0.81
Developed, High Intensity	1,351.60	0.23
Barren Land	4,194.89	0.71
Deciduous Forest	88,639.04	15.01
Evergreen Forest	409.55	0.07
Mixed Forest	290.16	0.05
Shrub/Scrub	6,096.55	1.03
Herbaceous	360,025.09	60.97

Existing Land Cover Type	*Total Area (acres)*	*Percent of County Area (%)*
Hay/Pasture	59,040.52	10.00
Cultivated Crops	12,483.69	2.11
Woody Wetlands	391.31	0.07
Emergent Herbaceous Wetlands	382.87	0.06
Totals (acres)	**590,452**	**100.00**

Source of Data: National Land Cover Database (NLCD) 2016.

Future Land Use: No current planning document exists for Wise County. Based on the planning team's review of available parcel data for the County, reviews of aerial photography and land use characteristics in the past and present, and the area of potential effects being within the Dallas-Fort Worth metropolitan area, additional development in Alvord is expected over the 103-year planning period. There are several sub-divided parcels shown on the county parcel data that are located within the area of potential effect, but for which no homes have yet been constructed.

ECOSYSTEM SERVICES RESOURCE CONCERNS

The relevant Ecosystem Services scoping concerns will be described in greater detail below.

Provisioning

General: Provisioning describes the tangible goods that are provided for direct human use and consumption.

Food: Approximately 10.6 acres of croplands were identified within the area of potential effect. The duration of flooding is short due to the small watershed size and impacts to food resources associated with the project are expected to be minimal, but present.

Regulating

General: Regulating maintains a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe.

Flood and Disease Control: FRS 26 was constructed in 1984 for the sole purpose of flood control. The structure in its current condition does not meet Texas requirements for high hazard dams with respect to spillway capacity during the design storm event (75 percent of the 2-hour Local PMP). The area of potential effect includes significant portions of the City of Alvord, Texas between FRS 26 and Big Sandy Creek. Should the design storm event occur and Big Sandy 26 were to breach, structures within the breach zone include:

- Approximately 61 Residential structures
- 6 Commercial structures
- 1 Government structure (Fire station)
- 7 Roads, including U.S. 287 and six other local roads
- The BNSF Railway

Supporting

General: Underlying processes maintaining conditions for life on earth.

There are no relevant Supporting EcoSystem Services scoping concerns associated with the proposed action.

Cultural

General: Makes the world a place in which people want to live.

There are no relevant Cultural EcoSystem Services scoping concerns associated with the proposed action.

THE PR&G GUIDING PRINCIPLES

A. Healthy and Resilient Ecosystems. Federal investments in water resources should protect and restore the functions of ecosystems and mitigate any unavoidable damage to these natural systems.

B. Sustainable Economic Development. Federal investments in water resources should encourage sustainable economic development.

C. Floodplains. Federal investments in water resources should avoid the unwise use of floodplains and flood-prone areas and minimize adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used.

D. Public Safety. Threats to people, including both loss of life and injury, from natural events should be assessed in the determination of existing and future conditions, and ultimately, in the decision-making process.

E. Environmental Justice. Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Agencies should ensure that Federal actions identify any disproportionately high and adverse public safety, human health, or environmental burdens of projects on minority, Tribal, and low-income populations.

F. Watershed Approach. A watershed approach to analysis and decision-making facilitates evaluation of a more complete range of potential solutions and is more likely to identify the best means to achieve multiple goals over the entire watershed.

According to PR&G, after preliminary consideration, agencies may remove from detailed study those alternatives that do not achieve the Federal Objective and Guiding Principles. In addition, alternatives that may at first appear reasonable but clearly become unreasonable because of cost, logistics, existing technology, social, or environmental reasons may also be eliminated from further analysis. These alternatives should be briefly discussed to indicate that they were

considered, and the analysis should document the reason(s) why they were eliminated (e.g., they do not achieve the Federal Objective and Guiding Principles).

OTHER CONCERNS IDENTIFIED THROUGH SCOPING

Geology and Soils

Geology: Big Sandy 26 was constructed on the Antlers Sand Formation in the Eastern part of the Trans-Pecos and High Plains. This formation is from the Early Cretaceous Period and is generally estimated to be 500 to 650 feet thick. The lower and upper parts of the formation are predominantly characterized as sand with the interior sections characterized as clays. The formation grades northward into interbedded sand and clay. Geologic maps indicate that the site is underlain by sandstone, claystone, and conglomerate (Bureau of Economic Geology, 1992). The 1983 Geology Report documented the formation at the site to be composed mostly of sandstone with interbeds of limestone, packsand, and shale.

The planning team reviewed the available geotechnical data for Big Sandy 26. The 1980's design investigation included soil test borings conducted by the Soil Conservation Service (SCS) along the proposed embankment centerline, and principal and auxiliary spillways. Test borings were also performed along the toe of the proposed dam and the borrow area located upstream of the embankment. One test pit was excavated within the borrow area and one in the former streambed.

Soils: USDA mapping was used to identify the soils in the vicinity of the Big Sandy 26 Reservoir. Seven soil types belonging to seven soil series are found within the reservoir area based on 2007 mapping by NRCS. The Windthorst fine sandy loam is the most prevalent and is located mainly on the east side of the reservoir.

EA Engineering, Science, and Technology, Inc. performed a desktop assessment of mapped soils within the vicinity of the reservoir site using Soil Survey Geographic Data Base (SSURGO) mapping. According to the Official Soil Series Descriptions and the National Hydric Soils list (NRCS 2009, NRCS 2015), the soils in the investigated study areas are classified as "Well Drained" or "Moderately-Well Drained".

Sediment and Erosion: The current Big Sandy 26 dam impounds an approximately 19-acre reservoir and was designed with a submerged sediment capacity of 90 acre-feet calculated using a 100-year design life. The surrounding land uses currently, and predicted for the future, are primarily rural, which contributes to sedimentation. A bathymetric survey completed in 2020 was utilized to estimate the accumulated sediment within the reservoir since its impoundment began 39 years ago. This sediment survey results indicated that a minor amount of sediment has accumulated within the reservoir, and ample sediment storage is still available within the reservoir for the next 103 years.

Water

Water Bodies (including Waters of the U.S.): Based on the definition of Waters of the United States (WOTUS), the streams, the impoundment, and the wetlands in the ISA are considered

WOTUS (U.S. Environmental Protection Agency [EPA] 2020; U.S. Army Corps of Engineers [USACE] 2012).

Wetlands present in the ISA include 0.15 acres of freshwater forested/shrub wetlands, 2.84 acres of freshwater pond wetlands, and 3.66 acres of riverine wetlands (Figure 4). These wetlands were identified and mapped using the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Online Mapper data (USFWS 2021a). In 1979, the USFWS adopted "Classification of Wetlands and Deepwater Habitats of the United States." by Cowardin et al. as the agency's official wetland classification system. Cowardin descriptions for each wetland type is included in Table 2 (Cowardin et al. 1979). The USDA NRCS has also adopted the Cowardin System as its standard wetland classification system. Wetlands from the NWI database are generated using high altitude aerial photography and field verified by USFWS for accuracy (Dahl et al. 2015).

Following comments received from NWMC, a wetlands field delineation was performed to further evaluate the presence of wetlands in the ISA. A total of nine (9) wetland areas were identified within the overall project area.

Water Quality: Impaired waters, also referred to as 303(d) waters, are waters that do not meet water quality standards even after pollution controls have been put in place. Neither the impoundment, the streams, nor the segment of Big Sandy Creek downstream of the dam site are classified as impaired waters (EPA 2021a; 2021b). Segments of Big Sandy Creek approximately 7.5 miles south of the ISA are listed as impaired for bacteria (EPA 2021a; 2021b). However, none of the watercourse segments in between the dam and these impaired segments are listed as impaired.

Any reservoir alternative may have temporary impacts to water quality during the construction process in the form of minor sedimentation and turbidity within the reservoir site and downstream. Since the construction activities will comply with stormwater Best Management Practices (BMPs), it is reasonable to conclude that the impacts, if present, will be negligible, short-termed, and limited to the confines of the project construction.

Water Quantity: The reservoir will not be used for water supply, and therefore no storage quantity requirements apply. For resource concerns associated with flooding, please refer to other applicable resource concerns described in this Plan.

Floodplain Management: Based on review of the Federal Emergency Management Agency (FEMA) flood insurance rate map for the study area (Panel 48497C0200D) effective 16 December 2011 (Appendix C), the subject watershed, dam, the unnamed tributary which it discharges into and the area of flooding upstream of FRS 26 are located in Zone X, an area of minimal flood hazard (FEMA 2021). FRS 26 was one of several dams constructed to protect Wise County from large flooding events. The project has direct and measurable influence on the floodplain during the design flood event.

Flood Damages: Flood damages downstream of the dam associated with frequency storm events (the 2-year through 500-year, 24-hour storm events) are mitigated by the presence of FRS 26. An

estimated $5,014,100 and $6,965,700 in damages (per event) is estimated if the existing dam breaches during the incipient flood (barely overtopping, 59% of the 2-hour Texas Local PMP) and the full PMP (100% of the 2-hour Texas Local PMP), respectively. The estimated average annual flood damage in the current conditions is approximately $2,800.

Wetlands: Wetlands present in the ISA include 0.15 acres of freshwater forested/shrub wetlands, 2.84 acres of freshwater pond wetlands, and 3.66 acres of riverine wetlands (Figure C-3). These wetlands were identified and mapped using the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Online Mapper data (USFWS 2021a). In 1979, the USFWS adopted "Classification of Wetlands and Deepwater Habitats of the United States." by Cowardin et al. as the agency's official wetland classification system. Cowardin descriptions for each wetland type are included in Appendix D (Cowardin et al. 1979). The USDA NRCS has also adopted the Cowardin System as its standard wetland classification system. Wetlands from the NWI database are generated using high altitude aerial photography and field verified by USFWS for accuracy (Dahl et al. 2015).

EAEST performed a field wetlands delineation as part of this planning study. The field work was conducted on October 11, 2023. The results of the field wetlands delineation are documented in a report dated December 2023. The report documenting the wetlands field investigation is provided in Appendix E.

Air

Air Quality: The Texas Commission on Environmental Quality (TCEQ) operates an air quality monitoring network. There is currently an air monitoring station in Decatur, TX which is approximately 11 miles from the reservoir. The Environmental Protection Agency also tracks the Air Quality Index throughout the United States. In reviewing both EPD and EPA's websites, no specific concerns were identified.

Plants and Animals

Threatened and Endangered Species: The USFWS IPaC report, included as Appendix D, returned one federally endangered bird species as potentially present in the ISA: whooping crane (Grus americana) (USFWS 2021b). Three additional bird species were listed on the report but are only required to be considered for wind energy projects. Additionally, the USDA Forest Service maintains a list of sensitive species that are not listed or proposed under the USFWS Endangered Species Act (USDA Forest Service 2005a). There are 332 sensitive animal species that have occurrences in the southern region (Region 8) (USDA Forest Service 2005b).

Formal consultation with USFWS and USDA Forest Service regarding this federally protected animal species is ongoing.

State Species of Concern: The TPWD Wildlife Division maintains county lists of protected species (both state and federally listed) and "species of greatest conservation need" as listed in the Texas Conservation Action Plan. Inclusion on the list indicates that the species has the potential to occur in the county and does not necessarily mean there has been a documented occurrence of that species in the county. The potential for occurrence is based on a variety of sources including the

Texas Natural Diversity Database, field guides, and various range maps and databases (TPWD 2020). The Wise County list of species includes 2 amphibian species, 10 bird species, 1 insect, 18 mammal species, 3 mollusks, and 8 reptile species with the potential to occur in the county (TPWD 2020). The full Wise County list of species, including federal and state status, is included as Appendix E.

Formal consultation with TPWD regarding protected animal species in Wise County will be conducted once the alternatives are formally developed and a limit of disturbance for each alternative is established.

Wildlife Community (includes Migratory Birds): The reservoir provides potential habitat for some the whooping crane. Nesting, brooding, feeding, roosting and loafing habitat is provided for migratory birds in shoreline vegetation, upland grassy areas and in adjacent tree cover.

Invasive Species: The Texas Department of Agriculture was consulted regarding invasive plant species within the project area, and no documented occurrences were found.

Fish Resources: All alternatives were evaluated for federally threatened and endangered species, in addition to state listed species, by consulting Stephan Magnelia, a TPWD fisheries biologist, to obtain information on fish species in the streams and impoundment tin the ISA. Mr. Magnelia confirmed that TPWD does not have data from the stream or the impoundment but suggested consulting the Fishes of Texas Project online webpage, which tracks fish observations in the state of Texas. The Fishes of Texas Project provided data on fish observations in streams approximately 10 miles south of the dam (Fishes of Texas Project 2021).

The TPWD Wildlife webpage and the iNaturalist webpage were both consulted to obtain a general knowledge of wildlife species that have occurred or are expected to occur in the ISA (TPWD 2021d; iNaturalist 2021).

An official species list from the Arlington Ecological Services Field Office, dated July 21, 2023, was obtained. The NLAA Concurrence Letter from the Arlington Ecological Services Field Office Determination Key was obtained on July 24, 2023. The aforementioned documents are provided in Appendix E.

Human

Cultural Resources / Historic Properties: To assess the impacts on cultural resources of all the alternatives, Schnabel commissioned AmaTerra to conduct a desktop study of historical and cultural resources within and near the project area. The desktop study involved a search of the Texas Historical Commission online sites Atlas, historic maps and aerial photographs, and additional resources with consideration of the local surficial geology and soils data. The desktop review included an evaluation of the potential to impact documented and undocumented cultural resources within the project area. The archaeological survey was completed during February 2024. A report documenting the findings, dated March 2024, is provided in Appendix E. No historic properties were identified within the limits of disturbance for all detailed alternatives.

Archeological Sites: No documented resources were identified in the project area during the desktop study. The potential for buried cultural deposits within the project area, particularly in areas which may be submerged if the maximum flood pool is reached, is moderate, based on the geologic and sedimentary history of the project area and the locations nearby where other archeological sites have been documented. Initial consultation with Texas Historical Commission (acting as SHPO) recommended an archaeological survey be conducted prior to construction. The archaeological survey was completed during February 2024. A report documenting the findings, dated March 2024, is provided in Appendix E. No archaeological sites were identified within the limits of disturbance for all detailed alternatives.

Historic Structures: The desktop study revealed no previously listed National Register of Historic Places (NRHP) properties, Recorded Texas Historic Landmarks (RTHLs), non-archaeological State Antiquities Landmarks (SALs), or Official Texas Historical Markers (OTHMs) within the study area. A review of the Texas Department of Transportation's Historic Resources of Texas Aggregator database revealed no NRHP properties or historic districts within or adjacent to the project area. Additionally, examination of historic aerials revealed no historic-age (50 years or older) resources within the project footprint. The dam itself was constructed in 1984, making it's age approximately 39 years. The potential for historic structures or potentially NRHP or state eligible historic properties to be adversely impacted by the proposed project is very low. The archaeological survey was completed during February 2024. A report documenting the findings, dated March 2024, is provided in Appendix E. No historic structures were identified within the limits of disturbance for all detailed alternatives.

Environmental Justice: Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires each Federal agency to make environmental justice a part of its mission. Agencies must identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations, low-income populations and Indian Tribes. The primary means to attain compliance with environmental justice considerations are: (1) Assessing the presence of environmental justice communities in a project area that may experience disproportionately high and adverse human health or environmental effects, and (2) The inclusion of low-income minority, Tribal, or other specified populations in the planning process. Additionally, E.O. 12898 established an Interagency Working Group on environmental justice chaired by the EPA Administrator and comprised of the heads of eleven departments or agencies, including the U.S. Department of Agriculture.

The USDA Departmental Regulation (DR) 5600-002 provides detailed determination procedures for National Environmental Policy Act (NEPA) and non-NEPA activities and suggests social and economic effects to consider when assessing whether there are disproportionately high and adverse human health or environmental effects to environmental justice communities in a project area.

An environmental justice and civil rights analysis was conducted for areas downstream of the dam. EPA's "EJSCREEN" tool was used to identify environmental justice groups within the breach inundation zone floodplain (affected area). The standard EJSCREEN report, included in Appendix X, depicts the results of utilizing the EJSCREEN tool and includes demographics and socio-

economics of the population of Texas compared to EPQ Region 6 and the United States. The total population within one mile of the dam is also provided in the EJSCREEN report.

Social and Economic Conditions

The statistics cited below were obtained from the U.S. Census Bureau for 2020. The affected area downstream of the dam includes the Town of Alvord and unincorporated Wise County. Statistics for the town of Alvord are cited when available, and when they are not, statistics for Wise County are provided.

Population and Race: The estimated 2020 population of Alvord, Texas is 1,351, up from 1,334 in 2010, and 1,007 in 2000. According to the Texas Water Development Board's 2021 Regional Plan for Region C, which includes Wise County, the projected population of Alvord in 2070 is 3,600. According to the U.S. Census Bureau, Wise County's population was 59,115 in 2010 and 68,632 in 2020, showing an increase over the last decade. The Water Development Board's estimate for the population of Wise County in 2070 is 208,872. It is estimated that the affected area, downstream of the dam, did not significant growth during the period 2000-2020. The Region C Regional Plan's estimated population growth for Alvord indicates that significant development within the downstream area is not likely.

Minority population by race is 21.2 percent in Wise County and 13.8 percent in Alvord.

Age: In Alvord, 70.7 percent are over the age of 18 and 9.0 percent are over the age of 65. In Wise County, about 75.3 percent of the people living within Wise County are 18 years older and above. Those age 65 years and older make up about 15.1 percent of the population. A field review reflected many older homes downstream of the dam, perhaps explaining in part the presence of older residents within the affected area.

Employment/Unemployment: According to the U.S. Census Bureau, 60.6 percent of the population over 16 years old in Wise County was employed in 2019. The rate for the state of Texas was 61.0 percent.

Income/Education: The median household income in Alvord was $60,469 in 2022, in Wise County the median household income was $67,726, and for Texas it was $63,826. When reviewing median household incomes, the median household income of Wise County is 6.1 percent higher than the state of Texas. Regarding education, the town of Alvord has a rate of 41.4 percent high school diploma for people aged 25 years old or older, and the rate is 34.2 percent for Wise County.

Poverty: The population living below the poverty level in Alvord is 4.6 percent, and is 10.4% in Wise County.

Housing: The percentage of the housing units in Alvord that are owner-occupied is 77.9%, and in for Wise County it is 79.6%.

Tribal Communities: There are currently three federally recognized Indian Tribes in Texas today, none of own lands within the vicinity of the dam site. There are no state-recognized tribes in the state of Texas.

Public Health and Safety: Public health and safety is a concern if the FWOFI alternative is pursued, as the level of flood control will decrease, thereby affecting downstream property owners.

Incidental Recreation: The Sponsor's project will not impact publicly-accessible recreation. The existing reservoir does not provide public recreation, and the proposed alternatives will not alter the normal pool footprint nor the uses of the reservoir.

Table D – Demographics and Socio-Economics of the City of Alvord, Wise County, Texas, and the State of Texas

Category	City of Alvord	Wise County	Texas
Total Persons	1,351	68,632	29,145,505
Persons Below Poverty Level	4.6%	10.4%	14.2%
Households in Area (#)	359	22,254	9,906,070
Race			
White	86.2%	78.8%	50.1%
African-American	0.9%	1.0%	12.2%
American Indian and Alaska Native	1.3%	1.0%	1.0%
Asian	0.4%	0.6%	5.4%
Native Hawaiian and Other Pacific Islander	0.0%	0.01%	0.1%
Other Race	4.4%	7.6%	13.6%
Multiracial	6.7%	11.0%	17.6%
Ethnicity			
Hispanic or Latino	9.8%	20.0%	39.3%
Not Hispanic or Latino	83.2%	73.6%	39.7%
Other[1/]	7.0%	6.4%	21.0%
Age Breakdown			
Age 0 - 18 years old	29.3%	24.7%	25.8%
Age 18+	70.7%	75.3%	74.2%
Age 65 years and older	9.0%	15.1%	12.5%
Gender			
Males	52%	50%	49.7%
Females	48%	50%	50.3%
Education Level (age 25 and over)			
High School Diploma	41.4%	34.2%	24.7%
Percent Bachelor's Degree or Higher	15.6%	18.8%	30.7%
Language Spoken at Home			
Language Other Than English	7.7%	16.5%	35.1%
Median Household Income	$60,469	$67,726	$63,826
Occupied Housing Units by Tenure			
Owner Occupied	56.5%	71.0%	55.5%
Renter Occupied	29.4%	18.2%	33.6%
Employed Population Age 16+ Years			
In Labor Force	38.2%	46.5%	46.2%

1/ "Other" was used to describe the difference between the Hispanic/Latino or Non Hispanic or Latino designations. This primarily includes those who did not report an ethnicity on Census data.

Description of Existing Dam

FRS 26 was designed in 1983 and construction was completed in 1984 as a low hazard structure. FRS 26 is located in Wise County on an unnamed tributary of Big Sandy Creek, approximately 3.4 river miles upstream of its confluence with Big Sandy Creek. The dominate land use within the watershed for was historically a combination of agriculture and woodlands, which generally remains unchanged today. FRS 26 was installed to provide flood damage protection benefits to the

City of Alvord. The original evaluated project life was 100 years, and so the existing O&M agreement expires in 2084.

The dam is a 34-foot tall earthen embankment with a drainage area of 435 acres (0.68 square miles). The surface area of the design permanent pool (sediment pool), or normal pool during non-flood periods, is approximately 18.7 acres. The maximum surface area at the crest of the existing dam is approximately 57 acres. The design submerged sediment storage volume was 90 acre-feet at the principal spillway crest elevation, the flood pool storage was 264 acre-feet, and the maximum storage volume was 413 acre-feet. The principal spillway system consists of a reinforced-concrete riser structure and outlet pipe. The riser is a standard covered riser with inside plan dimensions of 6 feet by 2 feet. The normal pool is established at elevation 904.7 feet (NAVD 88) by a 6-inch by 6-inch orifice. The top of the riser has 12 feet of weir length at elevation 907.5 feet. The principal spillway conduit is a 24-inch diameter pre-stressed, concrete lined, steel cylinder pipe (AWWA C-301). Seven anti-seep collars were installed along the principal spillway conduit. A 50-foot wide vegetated earthen auxiliary spillway channel is located in the left abutment. Flow through this channel is controlled by a 50-foot long control section (upstream to downstream) at elevation 910.3 feet.

Status of Operation and Maintenance

The existing Operation and Maintenance Agreement between the Sponsors and the NRCS was signed on January 2, 1979. However, the planning team was unable to locate the specific operation and maintenance manual for FRS 26. Based on the 100-year evaluated life of the original FRS 26, it is assumed that the O&M agreement expires in 2084.

Operation and maintenance of FRS 26 is currently the responsibility of Wise County. Sparse trees and overgrown vegetation and trees were present on the embankment during Schnabel's July 21, 2021 visual inspection. Maintenance responsibilities of FRS 26 will continue to be the responsibility of the Sponsors, who will comply with TCEQ and NRCS requirements for operations and maintenance. A new operation and maintenance plan is required prior to construction.

Breach Analysis and Hazard Classification

FRS 26 was constructed in 1984 as a low hazard potential structure. The structure has since been reclassified as high hazard by TCEQ. Breach inundation analyses were conducted as part of this environmental plan development. Based on the results of the design flood with breach event, the planning team concurs with the high hazard classification. As described in other portions of this plan, the Sponsors' need for action is the direct result of non-compliance with the hydraulic requirements for high hazard dams in Texas.

Evaluation of Potential Modes of Dam Failure

Dams are built for the conditions that existed, or could reasonably be anticipated, during the time of design. Sometimes these conditions change, resulting in the possibility for dam failure in the future. Several potential modes of failure were evaluated for Big Sandy 26.

Sedimentation: The original design submerged sediment volume was on the order of 90 acre-feet. Minor discrepancies between the 1984 storage volume estimates and the bathymetric survey performed as part of this plan were observed, which indicate that the submerged sediment storage capacity is on the order of 97 acre-feet. Based on these estimated volumes, the submerged sediment storage capacity appears to have increased since installation. Since this is unrealistic, the differences are considered to be the result of measurement accuracy between surveys conducted in 1984 and 2021. Based on the available submerged sediment volume obtained from the 2021 bathymetric survey, sediment yield over the past 36 years appears to be minor and less than the originally planned volume. The future sediment accumulation rate is expected to be the same or less than the historic rate. Based upon the historic sediment deposition within the reservoir, FRS 26 has sufficient submerged sediment storage for an extended service life. The potential for failure due to inadequate sediment storage capacity is low.

Hydrologic Capacity: Hydrologic failure of a dam occurs when the auxiliary spillway is breached or when the dam is overtopped. The design flood event in Texas for a small, high hazard dam is 75 percent of the Probable Maximum Flood (PMF). The critical duration was identified as 2 hours following guidance contained in GI-364 – Hydrologic and Hydraulic requirements for Dams in Texas. Using the Texas statewide PMP study, the Local 2-hour PMP was found to produce the controlling design flood event. Under present NRCS criteria for high hazard dams, the auxiliary spillway must have sufficient integrity and capacity to completely pass the Freeboard Hydrograph (FBH) event. The existing auxiliary spillway in its current configuration does not provide sufficient hydraulic capacity during the design flood event and the embankment overtops as a result. It is assumed that the dam will breach after overtopping. The overall potential for failure of the dam during the design flood event is high.

Spillway Integrity: Spillway integrity distance for the existing spillway was estimated using the SITES computer program, available geotechnical data from the original design, and other available resources. The analysis of the design flood event indicates that the auxiliary spillway has sufficient integrity distance during the design flood event and will not breach. The overall potential for a breach of the auxiliary spillway during the design flood event is considered low to moderate in its current configuration.

Seepage: 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, the voids created allow even more water flow through the embankment or foundation, until the dam collapses due to the internal erosion. Seepage that increases with a rise in pool elevation is an indication of a potential problem, as is stained or muddy water or “sand boils” (the up-welling of sediment transported by water through voided areas). 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. Big Sandy 26 was constructed with no internal filter drain system. While no evidence of uncontrolled seepage has been observed at the downstream toe of the embankment or on the downstream slope, the dam currently lacks Seepage monitoring instruments to evaluate the phreatic surface. In addition, lush vegetation and trees located near the toe of the embankment could be masking potential seepage concerns. For these reasons, the failure

of the dam due to uncontrolled seepage is considered moderate. Additional evaluation is recommended during the design phase.

Dispersive Soils: The SCS did not observe evidence of dispersive soils during the original design investigation in the 1980's, and Schnabel did not observe any visual evidence of dispersive soil erosion (i.e. jug holes) during the site reconnaissance conducted on July 14, 2021. The overall potential for failure of the dam due to dispersive soils migrating from the soil matrix is considered low. However, additional geotechnical exploration and evaluation is recommended during the design phase to screen for the presence of dispersive fines to support the understanding of this potential mode of failure.

Seismic: The structural integrity of an earthen embankment is dependent upon the presence of a stable foundation. Foundation movement through consolidation, compression, or lateral movement can cause the creation of voids or cracks within an embankment, separation of the principal spillway conduit joints, or, in extreme cases, complete collapse of the embankment. The Big Sandy 26 watershed is located within an area of low seismic hazard. Slope stability analyses using pseudo-static seismic conditions were analyzed. The upstream and downstream slopes of the embankment are expected to remain stable during a seismic event. Based on the results of the seismic analysis, the likelihood of failure due to a seismic event is considered low. However, additional geotechnical exploration is required to rule out the possibility of a liquefiable layer in the foundation soils and to support the analysis of this failure mode.

A stability and structural analysis of the existing riser was also performed as part of the planning evaluation. Based on the results of the stability and structural evaluation, failure of the riser during a seismic event is considered low.

Material Deterioration: The materials used in the principal spillway system are subject to weathering and chemical reactions due to natural elements within the soil, water, and atmosphere. Concrete risers and conduits 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. There is low potential for failure due to material deterioration of the principal spillway system based on the major components being comprised of concrete and steel. In addition, a closed-circuit television inspection was performed on July 14, 2021 to visually evaluate the interior of the principal spillway conduit and riser structure. The results of the visual evaluation did not indicate any significant structural concerns in the existing principal spillway conduit, and no significant deterioration within the conduit was observed.

Slope Stability: The upstream and downstream slopes of the existing dam are approximately 2.5H:1V, each with a mid-slope bench. On June 2, 2011, Freese and Nichols conducted a site investigation and noted signs of surficial slope instability, including irregular bulges and low spots, and two surface sloughs on the upstream slope, approximately 1 foot deep and 15-20 feet wide. During Schnabel's site inspection on July 14, 2021, a surface slough was observed on the upstream edge of the dam crest, adjacent to the left abutment. The slough was approximately 1 foot deep and 15-20 feet in width.

Schnabel performed slope stability analyses of the existing zoned embankment under various loading conditions as part of the development of this supplemental watershed plan. The slope stability analyses indicated that the maximum height section of the existing structure generally met required factors of safety for slope stability, with the exception of the upstream slope during the rapid drawdown condition. As such, additional soil strength testing of materials in the upstream slope is recommended. In the current condition, failure of the embankment due to slope stability is considered low to moderate.

Conclusion: At the present time, the most likely means of failure for FRS 26 would be the result of the design flood event, which would result in overtopping of the embankment and likely an uncontrolled release of the reservoir (breach). Though there is the potential for seismic-related slope failure or dam deformation, this is considered unlikely due to low ground motion accelerations in the area. Screening for dispersive fines in the foundation and/or liquefaction potential is recommended during the design phase. These types of failures could occur at any time during the remaining life of the structure. There is adequate sediment capacity for the evaluated life of the project.

Consequences of Dam Failure

Flood routing and breach inundation analyses were performed as part of this planning evaluation. In its current condition, the dam would overtop if the design flood event occurred. The overtopping of the dam would result in a sudden release of stored water from the reservoir. The consequences associated with the PMF with breach event of the existing structure include: a Population at Risk (PAR) on the order of 97; 61 residential structures; 6 commercial structures; 1 government structure (a fire station); 1 agricultural structure; 7 roadways; and the BNSF Railway. The total length of impacted roadway during the PMF with breach event is approximately 9,710 feet. The estimated economic damage resulting from the PMF with breach event is estimated to be $5,058,642. This event will result in the probable loss of human life.

If FRS 26 failed during sunny day conditions (e.g. no hydrologic event, reservoir at normal pool at time of breach), the associated consequences include: a PAR on the order 8; 4 residential structures; and 6 Roadways. The total length of impacted roadway during the PMF with breach event is approximately 3,580 feet. The estimated economic damage resulting from the Sunny Day breach event is estimated to be $795,419. This event will result in the probable loss of human life.

ALTERNATIVES

FORMULATION PROCESS

The formulation process began with formal discussions between the Sponsors and NRCS. Formulation of the alternatives generally followed procedures outlined in the NRCS *National Watershed Program Manual and National Watershed Program Handbook*. Other guidance incorporated into the formulation process included *Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments, Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments (*Department Manual 9500-13 or DM-9500) and the *NRCS National Resources Economics Handbook Part 611, Water Resources Handbook for Economics*, and other NRCS watershed planning policies. As a result, alternative plans of action were developed to address the need for action based on Federal planning requirements.

The six alternative plans that were considered include the following:

- Alternative 1: Future Without Federal Investment (FWOFI) / NEPA No-Action
- Alternative 2: Decommissioning
- Alternative 3: Structural Rehabilitation, Federally Assisted
- Alternative 4: Sponsors' Alternative*
- Alternative 5: Modify Dam to reduce hazard Classification, Federally Assisted
- Alternative 6: Floodproof Downstream Hazards, Federally Assisted

*Identical to Alternative 3, without Federal Assistance.

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Brief summaries of the alternatives that were considered, but removed from detailed study, are presented below:

Alternative 5: Modify the Dam to Reduce the Hazard Classification. FRS 26 is currently classified as a high hazard structure due to the consequences associated with an uncontrolled release of the reservoir during the design storm event. This alternative involves structural modification of the existing FRS 26 to reduce the maximum storage volume of the dam such that an uncontrolled release during the design storm event would result in a significant hazard classification under Texas law. The dam and spillway are currently capable of passing a storm event greater than 50 percent of the Probable Maximum Precipitation. However, after performing a variety of dam breach inundation analyses and subsequent review of the consequences associated with PMP breach events of FRS 26, it is unlikely that this can be accomplished without significant structural modification of the principal spillway riser and auxiliary spillway. Based on these factors, Alternative 5 was considered unfeasible and removed from detailed analysis.

Alternative 6: Floodproofing Downstream Structures. In its current configuration, the design storm event with breach of FRS 26 will result in the inundation of approximately 60 residential structures, 6 commercial structures, a government structure, an agricultural structure, 7 roadways

including U.S. 287, and the BNSF Railway. Additionally, significant uncertainty would remain if additional development within the area of potential effect occurs in the future and new hazards were constructed without appropriate flood protection measures, thus reverting FRS 26 back to high hazard. Based on the number of impacted structures associated with a PMP and breach event of FRS 26 and uncertainties surrounding future development within the area of potential effect, floodproofing the downstream hazards was considered unfeasible and removed from detailed analysis.

ALTERNATIVE PLANS CARRIED FORWARD

Detailed analysis focused on four viable alternatives to address the need for action. Brief summaries of the alternatives that were carried forward to detailed study are presented below:

Alternative 1: *No-Action Alternative (Future Without Federal Investment or FWOFI):* This alternative is the true no-action alternative, where the current condition of the structure will remain for the evaluated period, with routine maintenance activities performed by the Sponsors. The FWOFI and the effects produced by the FWOFI will serve as the baseline for comparing all other action alternatives with respect to all relevant scoping concerns and the affected environment.

Alternative 2: *Decommissioning with Federal Assistance*: This alternative involves a controlled breach of FRS 26, removal of all appurtenant structures, and re-establishing the floodplain, stream, and other nearby areas to a pre-project condition, prior to the construction of FRS 26 in 1984. Alternative 2 is a Federally-assisted decommissioning project.

Alternative 3: *Rehabilitate to high hazard standards (Texas and NRCS standards) with Federal Assistance:* This alternative involves the structural rehabilitation of FRS 26 to meet Texas and NRCS standards for small, high hazard dams. This alternative generally involves a combination of modifying the existing auxiliary spillway, raising the low areas of the embankment crest slightly with earth fill, installing a graded-aggregate filter through the toe of the embankment, and re-constructing the principal spillway energy dissipating structure. The auxiliary spillway channel will be widened to approximately 250 feet (final proportions to be determined during the design phase) and the control section will be raised to elevation 911.0 feet. Alternative 3 is a Federally-assisted project. Alternative 3 is the preferred alternative identified in this plan.

Alternative 4: The Sponsors have indicated that their preferred plan is Alternative 3 – Rehabilitate to high hazard standards (Texas and NRCS standards) with federal assistance. However, if federal funds are not available, then the sponsors have indicated that they will rehabilitate the dam to meet Texas and NRCS standards for high hazard dams. This is the probable plan if the responsible federal official finds no justification for expenditure of federal funds on this project. This alternative includes generally the same measures as Alternative 3. Since the environmental consequences of Alternative 4 are identical to those of Alternative 3, only the consequences of Alternative 3 will be described in the following sections and descriptions.

COMPARISON OF ALTERNATIVE PLANS

Tables E, F and G summarize the effects of each alternative considered. Refer to the Environmental Consequences section for additional information.

Table E – Summary and Comparison of Alternative Plans and Associated EcoSystem Services

	Alternatives		
	Alternative 1 – No Action/FWOFI	**Alternative 2 – Decommissioning with Federal Assistance**	**Alternative 3 – Structural Rehabilitation with Federal Assistance**
Alternatives			
Locally Preferred			X
Environmentally Preferable			X
Non-Structural	X		
Brief Description of Major Features	No-Action taken by the sponsors. Current conditions continue into the future, including inadequate spillway capacity. Dam breaches during the design storm event.	Federally-assisted Decommissioning project. FRS 26 is removed from service. The impoundment area is restored to natural, pre-project conditions.	Federally-assisted Structural Rehabilitation project, Labyrinth and Chute Spillway in Left Abutment, Upgrade and Replace Raw Water Pump Station in Place
Total Project Investment	-	$2,260,000	$3,195,000
Annualized Project Investment	-	$61,700	$87,300
Annual O&M Costs	-	$0	$26,900
Total Annual Costs	-	$61,700	$114,200
Monetized Net Benefits	-	-($224,300)	$2,000
Benefit to Cost Ratio	-	-(3.6)	0.0 (Near-zero)
End-of-Lifecycle Costs	May have high end-of-lifecycle costs to reverse/remove	Effectively creates an end-of-lifecycle by removing the structure	May have high end-of-lifecycle costs to reverse/remove
Provisioning Services	*Provisioning services are tangible goods provided for direct human use and consumption, such as food, fiber, water, timber or biomass.*		
Food	Approximately 10.7 acres of cropland are located within the area of potential effect. Minimal impacts anticipated due to short duration of flooding.	Without FRS 26 in place, downstream croplands are vulnerable. Adverse impacts could occur during the frequency storm events. Minimal impacts anticipated due to short duration of flooding.	Rehabilitation will reduce the likelihood of a breach during the design storm event, thereby providing protection to the 10.7 acres of cropland located downstream. Minimal impacts anticipated due to short duration of flooding.
Regulating Services	*Regulating services help maintain a world in which it is possible for people to live, providing critical benefits that buffer against environmental catastrophe.*		
Flood and Disease Control	Project will remain non-compliant with dam safety standards for high hazard dams. If the design storm occurs, FRS 26 could	Action will result in compliance with dam safety standards since FRS 26 will no longer exist.	Action will result in compliance with dam safety standards for high hazard potential dams. The likelihood of a breach during the

	Alternatives		
	Alternative 1 – No Action/FWOFI	**Alternative 2 – Decommissioning with Federal Assistance**	**Alternative 3 – Structural Rehabilitation with Federal Assistance**
	breach and cause substantial property damage and loss of life to the area of potential effect.	However, increased adverse flooding effects will occur downstream during the frequency storm events. Though the PMP with breach event is no longer relevant, if a PMP event occurred in the decommissioned state, significant damages and life loss would occur. Damage and life loss may also occur during smaller, less frequent storm events.	design storm event will be significantly reduced.
Supporting Services	*Supporting services refer to the underlying processes maintaining conditions for life on Earth, including nutrient cycling, soil formation, and primary production.*		
General	No relevant Supporting Services scoping concerns were identified for FRS 26.		
Cultural Services	*Cultural services make the world a place in which people want to live – recreational use, spiritual, aesthetic viewsheds, or tribal values.*		
General	No relevant Cultural Services scoping concerns were identified for FRS 26.		

Table F – Summary and Comparison of Alternative Plans and PR&G Guiding Principles

	Alternatives		
	Alternative 1 – No Action/FWOFI	**Alternative 2 – Decommissioning with Federal Assistance**	**Alternative 3 – Structural Rehabilitation with Federal Assistance**
Healthy and Resilient Ecosystems	No effect.	No effect.	No effect.
Sustainable Economic Development **Sustainable Economic Development (Continued)**	Economic Measures: A breach of FRS 26 during the design flood event will impact 7 roadways, the BNSF Railway, and several businesses within the City of Alvord. Social Measures: No effect. Environmental Measures: Consequences would result from dam failure resulting from inadequate hydraulic capacity.	Economic Measures: Without FRS 26 in service, the area of potential effect will be adversely impacted during the various frequency storm events. Social Measures: No effect. Environmental Measures: Increased downstream flooding during the frequency storm events may result in downstream erosion.	Economic Measures: Rehabilitation will reduce the likelihood of a breach during the design storm event. This in turn will reduce the economic impacts to downstream properties. Social Measures: No effect. Environmental Measures: Reduced likelihood of a breach will reduce environmental consequences associated with the design storm event. No changes are anticipated on downstream flooding during the 1-, 2-, 5-, 10-, 25-, or 50-year storm events. The 100-year storm event discharges will reduce slightly resulting in negligible differences. The 200- and 500-year

	Alternatives		
	Alternative 1 – No Action/FWOFI	**Alternative 2 – Decommissioning with Federal Assistance**	**Alternative 3 – Structural Rehabilitation with Federal Assistance**
			storm event discharges will increase slightly resulting in negligible differences.
Floodplains	No effect. Continued risk of flooding to downstream areas resulting from the design storm with breach scenario based on the non-compliant high hazard dam.	Increased downstream flooding during all frequency storm events may result in additional downstream erosion. Structural damages are anticipated.	Reduced likelihood of a breach will reduce environmental consequences associated with the design storm event. No changes are anticipated to downstream flooding during the 1-, 2-, 5-, 10-, 25-, or 50-year, 24-hour storm events. The 100-year, 24-hour storm event discharges will reduce slightly resulting in negligible differences. The 200-, 500-, and 1,000-year, 24-hour storm event discharges will increase slightly.
Public Safety **Public Safety (Continued)**	Continued risk of downstream flooding exists due to operation of a non-compliant high hazard dam. Consequences during the design storm (with breach) event include approximately: -60 residential structures -6 commercial structures -1 government structure -1 agricultural structure -7 roadways, including U.S. 287 -The BNSF Railway	The removal of FRS 26 will increase the likelihood of flood damages during the frequency storm events, and pose a potential health and safety risk to those who inhabit the structures. (The consequences vary for each storm event analyzed. Please refer to Appendix D for estimated flood damages during the frequency storm events). Consequences resulting from the design flood event (from FWOFI condition): -45 residential structures -2 commercial structures -1 government structure (fire station) -1 agricultural structure -7 roadways, including U.S. 287 -The BNSF Railway	The rehabilitation will reduce the likelihood of a breach occurring during the design flood. Consequences during the design storm event (without breach) include approximately: -3 residential structures -4 roadways
Environmental Justice	No effect. No disproportionate treatment of underprivileged persons is anticipated.	No effect. No disproportionate treatment of underprivileged persons is anticipated.	No effect. No disproportionate treatment of underprivileged persons is anticipated.
Watershed Approach	Continuation with no-action will not meet the Sponsors' purpose and need for the project.	Project will address the Sponsors' need for action, but will increase flooding to the area	Project will meet Sponsors' purpose and need for action.

	Alternatives		
	Alternative 1 – No Action/FWOFI	**Alternative 2 – Decommissioning with Federal Assistance**	**Alternative 3 – Structural Rehabilitation with Federal Assistance**
		of potential effect during frequency storm events.	

Table G – Summary and Comparison of Alternative Plans and Typical Concerns Identified through Scoping

Item or Concern	Alternative 1 – No-Action (Future Without Federal Investment / FWOFI)	Alternative 2 – Decommissioning with Federal Assistance	Alternative 3 – Structural Rehabilitation with Federal Assistance
SOILS			
Land Use	No short-term effect. If downstream development occurs in the future, those new structures may be vulnerable during the design storm with breach event.	No short-term effect. If downstream development occurs in the future, those new structures may be vulnerable during the frequency storm events or PMP events.	No short-term effects. However, if downstream development occurs in the future, those new structures will be better protected due to the reduced likelihood of a PMP with breach scenario.
Prime and Unique Farmland and Farmland of Statewide Importance	No short-term effect. Approximately 10.7 acres of farmland could be impacted during a design storm with breach.	No short-term effect. Approximately 10.7 acres of farmland could be impacted during the design storm.	Minor impact to < 0.1 acre of prime and unique farmland within the project area needed to re-establish energy dissipation structure. Provides additional protection to 10.7 acres of farmland in the area of potential effect by reducing the likelihood of a breach event.
WATER			
Water Resources, waters of the U.S.	No effect.	Coordination with USACE will be required to obtain permits to breach the structure, and for restoration of the stream and previously inundated areas.	Coordination with USACE will be required to obtain permits for working near waters of the U.S. A Nationwide permit is anticipated based on the small amount of disturbance.
Floodplain Management	No effect. Continued risk of flooding to downstream areas resulting from the design storm with breach scenario based on the non-compliant high hazard dam.	Increased downstream flooding during all frequency storm events may result in additional downstream erosion. Structural damages are anticipated.	Reduced likelihood of a breach will reduce environmental consequences associated with the design storm event. No changes are anticipated to downstream flooding during the 1-, 2-, 5-, 10-, 25-, or 50-year, 24-hour storm events. The 100-year, 24-hour storm event discharges will decrease slightly, resulting in positive, but negligible, differences to the 100-year floodplain. The 200-, 500-, and 1000-year 24-hour storm event discharges will increase slightly.

Item or Concern	Alternative 1 – No-Action (Future Without Federal Investment / FWOFI)	Alternative 2 – Decommissioning with Federal Assistance	Alternative 3 – Structural Rehabilitation with Federal Assistance
Streams, Lakes and Wetlands	No short-term effect. If FRS 26 breaches during the design storm, damage to downstream channels may occur.	Removal of FRS 26 will remove the lake. An estimated 2.5 acres of wetland disturbance may occur when the dam and appurtenant structures are removed, most of which are located around the existing reservoir. The segment of stream currently beneath FRS 26's lake will need to be re-established. Downstream damage may occur during frequent storm events due to increased discharges and loss of flood attenuation currently provided by FRS 26.	Minor (<0.1 acres) of wetland disturbance may occur near the toe of the dam as a result of the rehabilitation project. The rehabilitated structure will be less susceptible to breaching during the design storm event, which will reduce downstream discharges during the design storm event.
AIR			
Air Quality	No effect.	Minor short-term effects may occur during the decommissioning field work. Can be mitigated with appropriate dust control measures during construction. No long-term effects.	Minor short-term effects may occur during the decommissioning field work. Can be mitigated with appropriate dust control measures during construction. No long-term effects.
PLANTS			
Forest Resources	No effect.	No effect.	No effect. The anticipated limits of work in the project area do not require additional disturbance to the LBJ National Grasslands. Disturbance to forest resources will be avoided during design and construction.
Endangered and Threatened Species	No effect.	No effect.	No effect.
Invasive Species	No effect.	No effect.	No effect.
Ecologically Critical Areas	No effect.	No effect.	No effect.
ANIMALS			
Fish and Wildlife Resources	No effect.	No effect anticipated. Though no state-listed fish or wildlife species have been identified on site, removal of the lake may impact this habitat for other species.	No effect.
Migratory birds/Bald eagles/Golden eagles	No effect.	No effect anticipated. Though no protected bird species have been identified on site, removal of the lake may impact this habitat for migratory birds who use the lake for food or water.	No effect. Prior to removal of any trees or land disturbance activities, an ecological specialist in conjunction with NRCS will observe the area to confirm that no threatened or endangered species are present.
HUMANS			

Item or Concern	Alternative 1 – No-Action (Future Without Federal Investment / FWOFI)	Alternative 2 – Decommissioning with Federal Assistance	Alternative 3 – Structural Rehabilitation with Federal Assistance
Public Health and Safety	The continued operation of a non-compliant high hazard dam poses a potential threat to public health and safety within the area of potential effect.	The threat of a dam breach is removed by decommissioning the dam. However, increased flooding will occur during the frequency storm events.	The rehabilitated dam will reduce the likelihood of a dam breach scenario during the design storm event. The dam will comply with Texas law for high hazard dams and meet the federal standard of care set forth by USDA-NRCS.
Scenic Beauty	No effect.	The removal of the lake and dam will detract from the scenic beauty for surrounding residents and commuters.	No effect.
Historic Properties	No effect.	No historic properties have been discovered within the project area. Since removal of the structure will occur within the original limits of disturbance, no additional effects are anticipated.	No historic properties have been discovered within the project area. SHPO recommended an archaeological survey to be conducted for the presence of artifacts within the area of disturbance prior to construction.
Local and Regional Economy	The continued operation of a non-compliant high hazard dam poses a potential threat to commerce in the City of Alvord, due to the inundation of 6 businesses, 7 roadways, and the BNSF Railway. If development occurs within downtown Alvord, then additional impacts to the local and economy may occur resulting from dam failure.	Additional flooding will occur during the frequency storm events due to the loss of FRS 26. This may adversely impact local and regional economy due to impacted roadways and businesses. $2,260,000 of local construction expenditures providing 22 person-years of design / construction jobs and local sales and profits	The rehabilitation project will reduce the likelihood of a breach occurring during the design storm event, which in turn will reduce the consequences within the area of potential effect. The protection against a breach during the design flood event will reduce the potential for impacts to local and regional economy. $3,195,000 of local construction expenditures providing 31 person-years of design / construction jobs and local sales and profits.
Recreation	No effect.	Loss of the lake may adversely impact recreation. However, most of the project area is located on private property, so adverse impacts are minor.	No effect. No significant disturbance of the LBJ Grasslands beyond the footprint of the original project.
Park Lands	No effect.	No effect.	No effect. No significant disturbance of the LBJ Grasslands beyond the footprint of the original project.

ENVIRONMENTAL CONSEQUENCES

Water resources projects can result in several potential effects on resources upstream and downstream of a reservoir site. This section describes anticipated effects on resource concerns identified by the Sponsors, the public, and the planning team during the scoping process . The topics are listed in the same categories as are listed in Tables D and F.

Three alternatives were considered and evaluated in detail:

1. Alternative 1: Future Without Federal Investment (FWOFI) / NEPA No-Action Alternative
2. Alternative 2: Decommission FRS 26
3. Alternative 3: Structural Rehabilitation of FRS 26

PROVISIONING SERVICES

Food

Alternative 1 (FWOFI): Approximately 10.7 acres of cropland are located within the area of potential effect. Adverse impacts could occur during the design flood with breach event. However, the duration of flooding is low and so effects are assumed to be minimal.

Alternative 2 (Decommission): Approximately 10.7 acres of cropland are located within the area of potential effect. Adverse impacts could occur during frequency storm events. However, the duration of flooding is low and so effects are assumed to be minimal.

Alternative 3 (Structural Rehabilitation): Downstream croplands would be better protected since the likelihood of a breach event is substantially reduced by rehabilitation. However, the duration of flooding is low and so effects are assumed to be minimal.

REGULATING SERVICES

Flood and Disease Control

Alternative 1 (FWOFI): The project will remain non-compliant with dam safety standards for high hazard dams. The sponsors continue to operate the dam and performing regular operation and maintenance activities. The design flood eventually occurs, and the dam fails and breaches due to overtopping resulting from inadequate spillway capacity. Refer to Table E, “Public Safety” for a detailed description of the consequences.

Alternative 2 (Decommission): This alternative will meet the Sponsors’ need for action by removing the non-compliant dam from service, thus removing the dam safety issue. However, numerous economic consequences would result over a wide range of storm events. Refer to Table E, “Public Safety” for a detailed description of the consequences.

Alternative 3 (Structural Rehabilitation): This alternative will meet the Sponsors’ need for action by providing an auxiliary spillway that can pass the design flood event. The dam will be unlikely

to fail in this condition, and so a breach will not occur. Refer to Table E, "Public Safety" for a detailed description of the consequences.

SUPPORTING SERVICES

General: No relevant Supporting Services were identified within the scope of this assessment.

CULTURAL SERVICES

General: No relevant Cultural Services were identified within the scope of this assessment.

SOILS

Land Use

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): The land use that is currently designated as water will be restored to floodplain, pasture, and stream. The area of the existing permanent pool is approximately 18.7 acres.

Alternative 3 (Structural Rehabilitation): No effect.

Prime and Unique Farmland and Farmland of Statewide Importance

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): No effect.

Alternative 3 (Structural Rehabilitation): No effect.

WATER

Water Resources, Waters of the U.S.

Alternative 1 (FWOFI): No changes.

Alternative 2 (Decommission): Will require coordination with USACE and permitting. Pre-project stream conditions and floodplain areas will need to be re-established.

Alternative 3 (Structural Rehabilitation): Will require coordination with USACE and permitting. The construction should be covered under a Nationwide Permit. Temporary impacts may occur, but these effects will be mitigated by proper erosion and sedimentation control measures during construction.

Floodplain Management

Alternative 1 (FWOFI): Wise County has participated in the National Flood Insurance Program since the mid-1970s. The existing NRCS dam (constructed as a low hazard dam) was designed to manage the existing floodplain. The structure is now classified as a "high hazard" dam and does not meet safety and performance criteria (TCEQ or NRCS). The current flood designation is zone X (Area of Minimal Flood Hazard) for the dam, downstream tributary, and reservoir area. A continued risk of flooding to downstream areas exists from the design flood with breach event, based on the Sponsors' operation of a high hazard dam with inadequate spillway capacity.

Alternative 2 (Decommission): Increased downstream flooding will occur during all frequency storm events as compared with the FWOFI.

Alternative 3 (Structural Rehabilitation): This alternative will reduce the likelihood of dam failure and breach during the design flood event. The reduced likelihood of a breach will improve floodplain management.

Streams, Lakes and Wetlands

Alternative 1 (FWOFI): No changes are anticipated.

Alternative 2 (Decommission): Will require coordination with USACE. This alternative will eliminate the reservoir and has the potential to create new wetland areas along the banks of the re-established stream channel. Portions of the newly exposed areas that were previously inundated may also classify as wetlands. A field survey of wetlands is recommended during the design phase to confirm all potential impacts.

Alternative 3 (Structural Rehabilitation): Approximately 2.44 acres of wetlands may be temporarily impacted by this alternative. Less than 0.1 acres will be affected permanently, and the remaining disturbance is associated with temporary impacts of wetland areas that are located around the existing reservoir, and will only be affected if the reservoir must lowered for upstream slope rehabilitation. A field survey of wetlands is recommended during the design phase to confirm all potential impacts.

PLANTS

Forest Resources

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): No effect.

Alternative 3 (Structural Rehabilitation): No effect. Proposed rehabilitation measures will not adversely affect forest resources.

Endangered and Threatened Species

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): No effect, no endangered or threatened plant species identified in project area.

Alternative 3 (Structural Rehabilitation): No effect, no endangered or threatened plant species identified in project area.

Invasive Species

Alternative 1 (FWOFI): Based on consultation with Texas Department of Agriculture, there are no documented occurrences or observations of invasive or noxious plant species at the project site.

Alternative 2 (Decommission): No effect, no invasive plant species identified in project area.

Alternative 3 (Structural Rehabilitation): No effect, no invasive plant species identified in project area.

Ecologically Critical Areas

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): No effect, no ecologically critical areas identified in project area.

Alternative 3 (Structural Rehabilitation): No effect, no ecologically critical areas identified in project area.

ANIMALS

Fish and Wildlife Resources

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): Temporary impacts to non-aquatic habitat during construction, and permanent loss of reservoir habitat. The new configuration may provide new or different habitats in this area.

Alternative 3 (Structural Rehabilitation): The current reservoir area was evaluated for federally threatened and endangered species in addition to state listed species by consulting available online resources including: USFWS' Environmental Conservation Online System (ECOS), Information for Planning and Consultation (IPaC) and TPWD's Wildlife Division. This alternative makes no changes to existing habitat, with temporary disruptions during construction.

Threatened and Endangered Animal Species

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): Permanent loss of the reservoir will reduce the site's future potential for migratory birds to use.

Alternative 3 (Structural Rehabilitation): The USFWS IPaC report, included as Appendix D, returned one federally endangered bird species as potentially present in the ISA: whooping crane (Grus americana) (USFWS 2021b). Three additional bird species were listed on the report but are only required to be considered for wind energy projects.

Formal consultation with USFWS and USDA Forest Service regarding this federally protected animal species is ongoing and will continue while the Plan-EA is developed. Formal consultation has been initiated with USFWS and is ongoing.

State Species of Concern

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): The TPWD Wildlife Division maintains county lists of protected species (both state and federally listed) and "species of greatest conservation need" as listed in the Texas Conservation Action Plan. Temporary impacts are expected during construction.

Formal consultation with TPWD regarding protected animal species in Wise County is ongoing and will continue during the development of this Plan-EA.

Alternative 3 (Structural Rehabilitation): Temporary impacts are expected during construction.

Formal consultation with TPWD regarding protected animal species in Wise County is ongoing and will continue during the development of this Plan-EA.

Migratory Birds, Bald Eagle and Golden Eagle Protection Act

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): Construction activities may temporarily impact potential eagle habitat, but no eagles have been observed or documented on the site.

Alternative 3 (Structural Rehabilitation): Construction activities may temporarily impact potential eagle habitat, but no eagles have been observed or documented on the site.

Invasive Animal Species

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): No invasive animal species are present.

Alternative 3 (Structural Rehabilitation): No invasive animal species are present.

HUMAN

Public Health and Safety

Alternative 1 (FWOFI): Continued operation of the non-compliant high hazard dam will result in the eventual failure during the design flood event. Failure of FRS 26 will result in probable loss of life and disrupt emergency services due to roadways overtopping during the design storm event.

Alternative 2 (Decommission): Frequency storm events will cause increased flooding on downstream properties and roadways. Decommissioning of FRS 26 will result in increased danger to public health in the area of potential effect.

Alternative 3 (Structural Rehabilitation): Greatly reduces the likelihood of a breach during the design flood event. Will improve public health and safety by complying with TCEQ high hazard dam requirements and NRCS standards for high hazard dams.

Environmental Justice

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): To meet requirements of Executive Order (E.O.) 12898 dated February 11, 1994, an effort was undertaken to identify low-income and minority populations potentially affected by the proposed project action. An environmental justice and civil rights analysis was conducted for areas downstream of the dam. EPA's "EJSCREEN" tool was used to identify environmental justice groups within the breach inundation zone floodplain (affected area). The demographic index within a 1-mile radius of the site is 28 percent, compared with 47 percent for the state of Texas and 44 percent for EPA Region 6. No disparate treatment is anticipated as a result of the construction of this alternative.

Alternative 3 (Structural Rehabilitation): To meet requirements of Executive Order (E.O.) 12898 dated February 11, 1994, an effort was undertaken to identify low-income and minority populations potentially affected by the proposed project action. An environmental justice and civil rights analysis was conducted for areas downstream of the dam. EPA's "EJSCREEN" tool was used to identify environmental justice groups within the breach inundation zone floodplain (affected area). The demographic index within a 1-mile radius of the site is 28 percent, compared with 47 percent for the state of Texas and 44 percent for EPA Region 6. No disparate treatment is anticipated as a result of the construction of this alternative.

Scenic Beauty

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): Will remove the lake from service. This could adversely impact the scenic beauty of this site.

Alternative 3 (Structural Rehabilitation): The scenic beauty will be unaffected. The widening of the vegetated auxiliary spillway will not appreciably affect the visual quality of the site. The

normal pool elevation will not be changed as a result of these actions. The minor grading of the embankment crest will have an unnoticeable effect on scenic beauty.

Cultural and Historic Properties

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): No archaeological, cultural, or historical resources have been identified in the project area. No additional impacts are anticipated. Consultation with Tribes is going.

Alternative 3 (Structural Rehabilitation): No archaeological, cultural, or historical resources have been identified in the project area. No additional impacts are anticipated. Consultation with Tribes is ongoing.

Local and Regional Economy

Alternative 1 (FWOFI): If FRS 26 fails during the design flood event, local and regional economy may be temporarily disrupted due to the flooding of several local roadways, U.S. Highway 287, and the BNSF Railway.

Alternative 2 (Decommission): Removal of FRS 26 will result in increased flooding during the frequency storm events, which will impact roadways and residences. The increased flooding to roadways and residences may adversely affect local economy. $2,260,000 of local construction expenditures providing 22 person-years of design / construction jobs and local sales and profits.

Alternative 3 (Structural Rehabilitation): FRS 26 will be able to safely store and pass the runoff from the design flood event, and is not anticipated to overtop and breach. Without the breach, the consequences of flooding are substantially reduced, which will result in less disruption to the local economy. $3,195,000 of local construction expenditures providing 31 person-years of design / construction jobs and local sales and profits.

Recreation

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): Any recreational use of the reservoir will be removed. Effects are anticipated to be minor due to FRS 26 being located mostly on private property. However, portions of the reservoir are accessible from the LBJ National Grasslands.

Alternative 3 (Structural Rehabilitation): No effect.

Park Lands

Alternative 1 (FWOFI): No effect.

Alternative 2 (Decommission): Any recreational use of the reservoir will be removed. Effects are anticipated to be minor due to FRS 26 being located mostly on private property. However, portions of the reservoir are accessible from the LBJ National Grasslands.

Alternative 3 (Structural Rehabilitation): No effect.

CUMULATIVE EFFECTS

Alternative 1 (FWOFI)*:* The sponsors continue to operate a non-compliant high hazard dam. Development occurs within the City of Alvord and area of potential effect over the next 100 years. The consequences of a dam breach increase as new properties are constructed and more residents move into Alvord. The design flood occurs and causes FRS 26 to breach, sending a floodwave downstream causing significant economic damage and loss of life.

Alternative 2 (Decommission): The sponsors remove FRS 26 from service. Increased flooding occurs in the City of Alvord during the frequency storm events and larger events. The Sponsors' need for action is eliminated due to removal of the non-compliant high hazard dam, but the proposed action results in approximately $224,300 of lost annualized flood damage protection benefits that are currently provided by FRS 26.

Alternative 3 (Structural Rehabilitation): The Sponsors rehabilitate FRS 26 to meet TCEQ requirements and NRCS standards for high hazard dams. The increased spillway capacity allows FRS 26 to pass the design storm event without overtopping, thus greatly reducing the likelihood of a breach scenario. The measures required to achieve compliance with TCEQ requirements and NRCS standards for high hazard dams are no extensive, and can be designed to cause negligible impacts to previously undisturbed areas. The proposed action results in approximately $2,000 in additional average annual flood protection benefits. This alternative fulfills the Sponsors' need for action and provides significant flood protection benefits to this community.

RISK AND UNCERTAINTY

Risks associated with any dam safety project include: cost, land acquisition, receipt of necessary permits, acquisition of sufficient environmental mitigation, population forecasts and funding. These factors are, to some extent, out of the Sponsors' control and therefore create some risk and uncertainty surrounding the project.

Project costs are a function of the economy at the time the project is ready to construct. There is risk and uncertainty associated with cost and the Sponsor's ability to fund a project if the cost significantly increases.

The population projections supporting the project need, and therefore determining the project size and cost, are not 100% certain. While impossible to eliminate all risk, the Sponsor has taken the measures within its control to mitigate for potential risks.

The estimated peak water surface elevation during the probable maximum flood is less than the elevation of the proposed dam crest. The risk of real property flood-induced damage in the area between the proposed easement elevation and the top-of-dam elevation is considered to be extremely low. There are currently no upstream occupied structures with finished floor elevations below the proposed top-of-dam elevation. Although future development below the embankment crest is not expected during the evaluated life of the project, the Sponsors acknowledge the possibility of future development. Full development within the watershed and within the maximum flood pool of FRS 26 is unlikely due to the presence of LBJ National Grasslands on the east side of the lake.

EA observed that there may be other possible areas not identified by NWI as wetlands but may be classified as wetlands during a field delineation, should one be conducted. Some uncertainty exists regarding the final limits of wetlands and impacts. The final spillway configuration is subject to minor revision based on discussion with the property owner, NRCS design engineers, and following a detailed geologic exploration and geotechnical testing program. The uncertainty associated with the presence of wetlands can be largely mitigated during the design phase following field delineations.

CONSULTATION AND PUBLIC PARTICIPATION

The Sponsor engaged in and initiated significant consultation, coordination and public participation throughout the processing of its Environmental Assessment (EA) for the Big Sandy 26 project as further described below.

U.S. Fish and Wildlife Service

EA Engineering, Science, and Technology, Inc. (EA) consulted the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Online Mapper during investigation of the environmental impacts of the proposed alternatives. EA also consulted the USFWS website for Information for Planning and Consultation (IPaC) for information regarding endangered species near the project site. Formal consultation was initiated using the IPaC web-based platform and the project area for the proposed alternative. An official species list was obtained from the Arlington Ecological Services Field Office in a letter dated July 21, 2023.

Texas Parks and Wildlife Department

EA corresponded with Stephan Magnelia, a TPWD fisheries biologist, to obtain information regarding fish species in the streams and impoundments in the Big Sandy 26 watershed. Mr. Magnelia confirmed that TPWD does not have data from the stream or the impoundment but suggested consulting the Fishes of Texas Project online webpage, which tracks fish observations in the state of Texas. The Fishes of Texas Project provided data on fish observations in streams approximately 10 miles south of the dam (Fishes of Texas Project, 2021). The TPWD Wildlife webpage was consulted to obtain a general knowledge of wildlife species that have occurred or are expected to occur near the dam.

Texas Historical Commission

A coordination letter was sent to the Texas Historical Commission (THC) who is serving as the State Historical Preservation Office (SHPO). THC reviewed the desktop study results and requested that an archaeological field investigation be performed. ERG performed an archaeological field survey of the project area. Since a portion of the project area is located on LBJ National Grasslands (administered by the United States Forest Service) coordination with USFS was also conducted. ERG prepared a report documenting the findings of the field reconnaissance and shovel test surveys. No historic sites, artifacts or structures eligible for the NRHP were identified from the field reconnaissance and the report document these findings was submitted to THC and USFS. No other cultural resource concerns were identified by THC or USFS in discussions regarding this project.

Tribal Coordination

While the Natural Resource Conservation Service (NRCS) Texas works to build a relationship with Federally Recognized Tribes (FRT) in this county through establishing Tribal consultation protocols, the Cultural Resource Specialist (CRS) is responsible for inviting Tribes to consult on proposed projects that may impact places of cultural or religious significance and NHPA historic properties. NRCS-Texas recognizes Tribal sovereignty and importance of Tribes' interest in places of cultural or religious significance on ancestral lands, including those on private lands. Consulting with Tribes cannot be delegated to the sponsor and is the responsibility of the Responsible Federal Official (RFO), the NRCS-TX State Conservationist.

NRCS initiated Tribal Consultation under Section 106 with Federally Recognized Tribes (FRT) with ancestral interests in the project area January 11, 2021. As of July 12, 2023, there have been no responses yet from Tribes. After receiving the final report on the Intensive Archaeological Survey from the contractor in March 2024, NRCS submitted a cover letter to SHPO and final project update to Tribes requesting concurrence with the official determination of identified cultural resources at the site and formal findings of effect. The archaeological field investigation and report documenting the findings indicated no historic properties, archaeological sites or artifacts within the footprints of the alternatives studied in detail.

Public Participation

The Sponsor places a priority on keeping the public informed on its operations and to invite public input on plans. The Sponsors conducted a public meeting on January 14, 2021 to discuss the Big Sandy 26 project with members of the public. There was an opportunity for public comments at the conclusion of the meeting.

Four live comments were received during the scoping meeting and no follow-up questions or comments were received after the meeting. A question or comment regarding potential stream restoration was made by Reese Sewell of the USDA forest service. Mr. Sewell asked if there would be an opportunity to incorporate stream restoration aspects into the project. However, the limited scope of the project did not provide opportunity for adding this scope to the project with respect to meeting the purpose and need of the project. Additional consultation with the USDA Forest Service is ongoing, and the draft Plan-EA will be submitted to the Forest Service for additional comments on the plan.

A public meeting to present the draft Plan-EA document and findings was conducted on May 29, 2024. The Draft Plan-EA was posted to the Wise Soil & Water Conservation District website for interested parties to review and comment. Letters were sent to stakeholders and property owners to solicit their feedback and input on the Watershed Plan. Comments received on the Plan-EA and public meeting are contained in Appendix A.

LOCALLY PREFERRED ALTERNATIVE

Rationale for the Plan Selection

Alternative 3 is the locally preferred alternative. This alternative provides a wider auxiliary spillway with a proposed width of 250 feet (minimum), a slight raise of the auxiliary spillway control section, a slight raise of the low-point of the embankment crest, a graded-aggregate filter drain installed into the foundation at the toe of the embankment, and construction of an energy dissipating structure. The hydraulic capacity of this proposed spillway provides an estimated 0.7 foot of freeboard above the maximum water surface elevation during the TCEQ required design flood event. By passing the design flood event, the likelihood of dam failure and a breach is significantly reduced and not anticipated. Alternative 3 addresses the Sponsors' need for action by addressing the dam safety deficiency. The spillway layout should be reviewed and modified as required following geotechnical exploration and laboratory testing. Additional layout modifications may be required based on the results of the archaeological survey, field investigations of environmental resources within the limits of disturbance, discussions with the property Owners and NRCS, and other factors during the final design phase of the project. Decommissioning the dam would also satisfy the Sponsors' need for action, but would result in a loss of $224,300 in annual average flood protection benefits.

Summary and Purpose

The selected plan of action for the modifications to the embankment and spillway is to:

- Excavate a widened auxiliary spillway channel in the left abutment of the dam to a minimum of 250 feet.
- Raise the auxiliary spillway control section to elevation 911.0 feet.
- Raise low areas of the embankment crest to a minimum elevation of 914.0 feet.
- Construct a filter diaphragm around the principal spillway conduit and a filter section through the toe of the dam into the foundation.
- Construct a reinforced-concrete impact basin or riprap lined plunge pool at the outlet of the principal spillway.

After the implementation of these planned works, FRS 26 will meet current TCEQ requirements and NRCS standards for high hazard dams. Detailed structural data for the proposed dam can be found in Table 3.

Permits and Compliance

Prior to construction, the Sponsors will be responsible for obtaining all required permits. During construction, the successful contractor is required to implement and maintain Erosion,

Sedimentation, and Pollution Control (ES&PC) Plans and acquire any applicable air quality and erosion and sediment control permits. ES&PC Plans will outline the steps that an operator must take to comply with the permit, including water quality and quantity requirements to reduce pollutants in the stormwater runoff from the construction site. The ES&PC Plans also specify all potential pollutant sources that could enter stormwater leaving the construction site and will cover methods used to reduce pollutants in stormwater runoff during and after construction.

The National Flood Insurance Program regulations states: "*A community's base flood elevations may increase or decrease resulting from physical changes affecting flooding conditions. As soon as practicable, but not later than six months after the date such information becomes available, a community shall notify the Administrator of the changes by submitting technical or scientific data in accordance with this part. Such a submission is necessary so that upon confirmation of those physical changes affecting flooding conditions, risk premium rates and flood plain management requirements will be based upon current data*." The planning team notes that the unnamed tributary that FRS 26 is located on, FRS 26 itself, and the upstream pool area are not currently a FEMA studied reach.

The following natural-resource-related permit applications and activities are likely necessary depending on disturbance areas outlined during the design process:

Texas Commission on Environmental Quality – Stormwater General Permit for Construction Activities and approval of construction drawings and specifications for a high hazard dam.
Wise County, Texas – Floodplain Development Permit Application Form
Wise County, Texas – Land Disturbance Permit
U.S. Army Corps of Engineers Nationwide 404 Permit
Archaeological Survey (Completed February 2024)
Field Investigation for the presence of threatened or endangered animals
Field Investigation for the presence of wetlands (Completed October 2023)

Other state or local permits may be necessary, and this determination will be made during pre-permit application meetings with local, state and federal regulatory agencies once designs have been sufficiently developed to facilitate those conversations.

Costs

Cost Table 1 shows the total installation cost of the selected plan ($3,195,000). Of this amount, PL 83-566 funds will bear $2,065,300 and nonfederal funds will bear $1,129,700. Cost Table 2 shows details of the costs and cost-share amounts by category. Structural data associated with the proposed structure are presented in Cost Table 3. The total annualized costs are presented in Table 4, including installation costs and estimated operation and maintenance costs. Cost Table 5 presents the average annual flood damage reduction benefits by flood damage categories. Cost Table 6 presents annual costs and benefits associated with the preferred alternative. A 2023 price base was used and amortized at 2.50 percent interest for the 100-year period of analysis for amortized costs.

The cost projections for the proposed construction measures are estimated costs only for planning. The fact that these costs are included in this plan does not infer that they are final costs. Detailed

structural designs, geologic explorations and construction cost estimates will be prepared prior to contracting for the construction work to be performed. Final construction costs will be those costs incurred by the contractor performing the work, including the cost of any necessary contract modifications. A 25 percent contingency was applied to the engineer's opinion of probable construction cost and the real property rights costs.

Installation and Financing

The project is planned for installation in about 36 months. During construction, equipment will not be allowed to operate when conditions are such that soil erosion and water, air, and noise pollution cannot be satisfactorily controlled.

NRCS will assist the Sponsor with the Big Sandy FRS 26 Rehabilitation project. NRCS will be responsible for the following:

- Execute a project agreement with the Sponsor before either party initiates work involving funds of the other party. Such agreements set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.
- Execute a Memorandum of Understanding with the Sponsor to provide a framework within which cost-share funds are accredited.
- Execute a new Operation and Maintenance Agreement with the Sponsor that extends the O&M responsibilities for 100 years following construction completion. This agreement will be based on the NRCS National Operation and Maintenance Manual.
- Verify that a current Emergency Action Plan is developed before construction is initiated.
- Provide consultative engineering support, technical assistance, and approval during the design and construction of the project.
- Provide contract administration technical assistance during construction of the project.
- Provide construction management technical assistance.
- Certify completion of all installed measures.

The Sponsor will be responsible for the following:

- Secure all needed environmental permits, easements, and rights for the installation, operation, and maintenance of the reservoir dam.
- Prepare an updated Emergency Action Plan for the dam prior to the initiation of construction.
- Execute a Memorandum of Understanding with the NRCS to provide a framework for crediting in-kind services.
- Execute a new Operation and Maintenance Agreement with NRCS for the dam. This agreement will be based on the NRCS National Operation and Maintenance Manual.
- Provide engineering services for the design, construction, and certification of the project.
- Provide local administrative and contract services necessary for the installation of the project.

- Provide nonfederal funds for cost-sharing of the project at a rate equal to, or greater than, 35 percent of actual construction costs.
- Participate in and comply with applicable Federal floodplain management and flood insurance programs.
- The land rights prohibit future construction of inhabitable dwellings upstream from the dam below the acquired land rights.
- Enforce all associated easements and rights-of-way for the safe operation of the dam.

Operation, Maintenance and Replacement

Measures installed as part of this plan, will be operated and maintained by the Sponsor with technical assistance from federal, state, and local agencies in accordance with their delegated authority. A new Operation and Maintenance (O&M) agreement will be developed for Big Sandy 26 and will be executed between the Sponsor and the NRCS prior to construction of the project. The term of the new O&M agreement will be for 100 years following the completion of construction. The agreement will specify responsibilities of the Sponsor and include detailed provisions for retention, use, and disposal of property acquired or improved with PL 83-566 cost sharing. Provisions will be made for free access of state and federal representatives to inspect all structural measures and their appurtenances at any time.

Property Rights and Easements

The sponsors have current, original easements which lack specified flood easement elevation or surveyed structure extent. The broad wording of these easements will require greater definition by the Sponsors in order for the construction of the dam rehabilitation project to proceed. The recommended minimum easement elevation for FRS No. 26 is elevation 912.3 feet NAVD 88 (the original auxiliary spillway control section elevation plus two feet). The probable maximum flood is contained below the proposed top-of-dam elevation. The risk of real property flood-induced damage in the area between the proposed easement elevation and the top-of-dam elevation is considered to be low. There are currently no upstream occupied structures with finished floor elevations below the proposed dam crest elevation 914.0 feet.

Mr. Garry Bible of the Wise Soil and Water Conservation District met on site with the owners of the primary parcel in which the project area is located (Mr. and Mrs. Neighbors). Mr. Bible presented The Neighbors with the conceptual alternative schematics at that time (July 2021). The Neighbors indicated that the alternative concept at that time appeared acceptable, with the request that the area on the north (right abutment) downstream of the dam referred to as their pasture be avoided from disturbance. The planning team subsequently adjusted the limits of disturbance based on this request, since that area had been identified as possible contractor staging or additional borrow source for the raising/flattening of the embankment, if required.

The Contractor team was notified via e-mail from the Sponsors on January 5, 2022 that the Neighbors had sub-divided his property and sold a tract of land to a private owner on the right abutment of the dam. The new owner has since completed constructing a house based on photographic evidence provided in the January 5, 2022 e-mail and subsequent site reconnaissance by J Ryan Collins, PE of Schnabel Engineering, LLC on March 23, 2023.

This new home impacted the originally-planned crest of dam elevation, the auxiliary spillway width, construction access, and staging areas. By the time the house was completed, the site survey and most of the hydrologic and hydraulic analyses had already been completed for this supplemental watershed plan. Survey of the house's finished floor elevation is recommended during the design phase, and any grading at the site will need to be performed in a manner that avoids flooding this home. A flood easement may be required since the pool during the design flood event may encroach upon portions of the new property owner's backyard. Additional modifications to the spillway may be required during the design phase following geotechnical exploration, consultation with NRCS hydrologic and hydraulic engineers, and additional discussions with The Neighbors.

The Sponsors indicated that they have been discussing the issue with their legal team to evaluate options about this property change. The Sponsors and NRCS will further review the real property rights during the design phase. The Design Team will need to consider the presence of the home and property boundaries, since the presence of this home and new parcel will impact the planned spillway design, dam crest elevation and access to the site for construction.

The Sponsors and the landowners acknowledge and accept the risks associated with allowing future construction to occur at elevations lower than the elevation of the Probable Maximum Flood. The 75%, 2-Hour Local Texas Probable Maximum Flood peak water surface elevation is 913.3 feet NAVD 88. The area of upstream flooding in the proposed configuration at elevation 913.3 feet is approximately 57 acres.

ECONOMIC TABLES

Table 1 - Estimated Installation Cost, Big Sandy Creek, Texas, [1/]

Works of Improvement	Public law 83-566 Funds	Other Funds	Total ($)
	NRCS		
Rehabilitate FRS 26[2/]	$2,065,300	$1,129,700	$3,195,000
Total Project	**$2,065,300**	**$ 1,129,700**	**$3,195,000**

[1/] Price Base: 2023 Prepared: July 2023

2/The land ownership category was omitted from the table. While the project area is located partially on USDA-FS-administered land, the USDA-FS is not participating in the project. In addition, the portion of the project located on the USDA-FS-administered land (approximately 2.1 acres) already contains the existing auxiliary spillway approach channel, and virtually no additional disturbances beyond the limits of the existing auxiliary spillway approach channel are anticipated as a result of the proposed action.

Table 2 - Estimated Cost Distribution - Rehabilitate FRS 26, Big Sandy Creek, Texas $[1/]

Works of Improvement	Installation Cost - Public Law 83-566 Funds						Other Funds						Total
	Construct-ion	Engineer-ing[3/]	Permits	Real Property Rights [2/]	Project Admin	Sub-Total Public Law 566	Construct-ion	Engineer-ing	Permits	Real Property Rights [2/]	Project Admin	Sub-Total Other Funds	Installation Costs
Rehabilitate FRS 26	$1,574,800	$465,500	$0	$0	$25,000	$2,065,300	$782,700	$9,500	$100,000	$187,500	$50,000	$1,129,700	**$3,195,000**

Footnotes:

1/ Price base: 2023 Prepared: July 2023

2/ Costs associated with permanent auxiliary spillway easements, if required, and temporary construction easements.

3/ Includes geotechnical exploration and testing, design, archaeological survey, and environmental coordination.

Table 3 – Structural Data – Big Sandy 26 – Proposed Alternative 3
Wise County, Texas

Item	Unit	Proposed Structure Data
Hazard class of structure		High
Total drainage area,	mi^2	0.68
Runoff curve no. (1-day) (AMC II)		60
Time of concentration (T_c); uncontrolled drainage area only	hours	0.36
Elevation crest of dam [1/]	feet	914.0
Elevation control section of auxiliary spillway	feet	911.0
Elevation crest high stage inlet	feet	907.5
Elevation crest low stage inlet	feet	904.7
Auxiliary spillway type	type	Vegetated
Auxiliary spillway crest width	feet	250
Auxiliary spillway exit slope	percent	4.5%
Maximum height of dam	feet	35
Volume of fill[4/]	yd^3	63,000
Total capacity [2/]	acre-feet	297.3
Sediment submerged [3/]	acre-feet	97.2
Sediment aerated [3/]	acre-feet	0
Dead storage	acre-feet	N/A
Floodwater retarding	acre-feet	200.1
Surface area		
Sediment pool	acres	18.7
Floodwater retarding pool [2/]	acres	46.0
Principal spillway design		
Rainfall total (1-day)	inches	9.15
Rainfall total (10-day)	inches	15.10
Capacity of low stage (max.)	$feet^3/sec$	3.5
Capacity of high stage (max.)	$feet^3/sec$	66.4
Dimensions of conduit	feet	2
Type of conduit		Conc. Lined Steel Cylinder (AWWA C-301)
Frequency of operation – auxiliary spillway	percent chance	≈ 1.0%
Auxiliary Spillway Hydrograph (SDH, 2-hour)		
Rainfall total	inches	8.74
Runoff volume	watershed inches	3.90

Item	Unit	Proposed Structure Data
Storm duration	hours	2
Velocity of flow (V_e)[5/]	feet/sec.	N/A
Max. reservoir water surface elev.	feet	910.67
Freeboard hydrograph (FBH, 2-hour)		
Rainfall total	inches	20.91
Runoff volume	watershed inches	14.60
Storm duration	hours	2
Max. reservoir water surface elev.	feet	914.0
Capacity equivalents		
Floodwater retarding volume	watershed inches	5.52

Prepared : July 2023

1/ All elevations are recorded in North American Vertical Datum 1988 (NAVD 88). Elevation refers to the lowest point(s) on the crest after rehabilitation.
2/ Proposed Control section elevation of auxiliary spillway.
3/ Available submerged sediment storage per 2021 bathymetric survey.
4/ Volume of fill from 1984 record drawings = 61,930 cy. Assumed 1,070 cy of fill required to raise embankment. Final fill volume to be determined in coordination with NRCS design staff during design phase.

5/ 2-Hour SDH event does not reach auxiliary spillway control section.

Table 4 – Estimated Average Annual NED Costs, Big Sandy Creek, Texas $[1/]

Works of Improvement	Amortization of Installation Costs[2/]	Operation, Maintenance and Replacement Cost	Costs
Rehabilitate Big Sandy FRS 26	$87,300	$26,900	$114,200
Total:	$87,300	**$26,900**	**$114,200**

1/ Price base: 2023

Prepared: July 2023

2/ The average annual equivalents are based on a 2.50% discount rate and a 100-year amortization period.

Table 5 – Estimated Average Annual Flood Damage Reduction Benefits, Big Sandy Creek, Texas $[1,4/]

Item[3/]	Estimated Average Annual Damage		
	Without Project	With Project	Damage Reduction Benefits[2/]
Floodwater			
Crop and Pasture[3/]	$0	$0	$0
Roadways	$900	$500	$400
Residences/Structures	$1,900	$300	$1,600
Subtotal	$2,800	$800	$2,000
Totals:			**$2,000**

1/ Price base: 2023 Prepared: July 2023

2/ Additional benefits exist based on reduced risk of failure and breach during the design storm event, including monetary benefits and benefits associated with protecting human life. Detailed comparisons of the alternatives are presented in Tables E, F and G.

3/ Some crop and pasture land exist within the downstream flood areas. The crop and pasture are primarily fallow. Due to the short duration of flooding, crop and pasture damages are assumed $0.

4/ All impacts are considered agricultural based on the rural setting of the project.

Table 6 – Comparison of NED Benefits and Costs, Big Sandy Creek, Texas $[1,3/]

	Flood Damage Reduction	Average Annual Benefits[2/]	Average Annual Costs	Benefit/ Cost Ratios[4]/
Rehabilitate Big Sandy Creek FRS 26	$2,000	$2,000	$114,200	0.0
Totals:	**$2,000**	**$2,000**	**$114,200**	**0.0**

1/ Price base: 2023 Prepared: July 2023

2/ The average annual equivalents are based on a 2.50% discount rate and a 100-year period of analysis.

3/ All impacts are considered agricultural based on the rural setting of the project.

4/ Additional benefits exist based on reduced risk of failure and breach during the design storm event, including protecting human life. Detailed comparisons of the alternatives are presented in Tables E, F and G. The estimated benefit / cost ratio is 0.02 or near-zero.

SUMMARY OF PRINCIPLES, REQUIREMENTS & GUIDELINES (PR&G) ANALYSIS REQUIREMENTS

The NRCS National Watershed Program Manual (NWPM) was used as a reference for the economic analysis along with three other documents: the *National Resource Economics Handbook, Part 611 Water Resources Handbook for Economics*, USDA/Natural Resources Conservation Service, July 1998; *Principles and Guidelines for Water and Land Related Resources Implementation Studies (P&G)*, December 1983; and *Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments (PR&G), DM 9500-013*. The latter includes requirements set forth in the Council on Environmental Quality (CEQ) *Principles and Requirements for Federal Investments in Water Resources (P&R)* and *Interagency Guidelines (IAG)*. DM 9500-013 and DR 9500-013 provides guidance on completing a PR&G analysis, including steps in the planning and evaluation process, differences between project- and programmatic-level evaluations, direction on incorporating an ecosystem services framework, and techniques for economic analysis.

PR&G requires that public benefits (monetary and non-monetary) be maximized relative to cost. Furthermore, there is not a hierarchal relationship among the economic, social, or environmental goals. In general, the economic, social, and environmental impacts presented in this plan were developed based on PR&G utilizing methods of evaluating rural community flood reduction damages and related impacts. In order to estimate annual benefits of Big Sandy 26, average annual floodwater damages and impacts as the result of no dam in place were compared to average annual floodwater damages and impacts with the dam in place.

In cooperation with local interests that have oversight or implementation authorities and responsibilities, a "locally preferred" alternative was identified. This alternative was fully considered and carried forward into the final array of solutions and given full and equal consideration in the decision-making process.

PR&G allows a wide range of alternatives to illustrate the range of potential tradeoffs among environmental, economic, and social goals. Alternatives considered included the Future Without Federal Investment (FWOFI) Alternative, nonstructural alternatives, the locally preferred alternative, and the National Efficiency Evaluation (NEE) Alternative. Alternatives were compared against the FWOFI Alternative which involved projecting existing resources and conditions into the future to establish a benchmark against which alternatives were evaluated. Tradeoffs between alternatives with respect to environmental, economic, and social goals were identified.

REFERENCES

ESRI, ArcGIS Desktop 10.6.1

Freese and Nichols, Inc., Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications: *2021 Region C Water Plan*, prepared for the Region C Water Planning Group, November 2020.

NOAA, National Climatic Data Center, Climate Data Online.

https://www.nctcog.org/regional-data/regional-data-center

U.S. Army Corps of Engineers, Hydrologic Engineering Center, 2008, HEC-RAS River Analysis System, Version 6.4

USDA, NRCS, National Engineering Handbook

USDA, NRCS, National Engineering Manual

USDA, NRCS, National Operation and Maintenance Manual

USDA, NRCS, National Planning Procedures Handbook

USDA, NRCS, 2014, National Watershed Program Handbook

USDA, NRCS, 2015, National Watershed Program Manual

USDA, NRCS, 2013, Guidance for Completion of Evaluation of Potential Rehabilitation Projects

USDA, NRCS, 1998, National Resource Economics Handbook, Part 611 Water Resources Handbook for Economics

USDA, NRCS, 2005, Water Resources Site Analysis Program (SITES), Version 2005.1.8

USDA, NRCS, 2004, Hydrologic Soil-Cover Complexes, National Engineering Handbook, Part 630 Hydrology, Chapter 9

USDA, NRCS, 2010, Time of Concentration, National Engineering Handbook, Part 630 Hydrology, Chapter 15

USDA, NRCS, 1986, Urban Hydrology for Small Watersheds, Technical Release 55

USDA, NRCS, 2014, Guide for Design and Layout of Vegetated Wave Protection for Earthen Embankments and Shorelines, Technical Release 56

USDA, NRCS, 2019, Earth Dams and Reservoirs, Technical Release 60

U.S. Department of Commerce, NOAA Atlas 14, Precipitation Frequency Data Server

U.S. Department of Commerce, NOAA, Probable Maximum Precipitation Estimates, United States East of the 105th Meridian, Hydrometeorological Report 51

U.S. Army Corps of Engineers, Hydrologic Engineering Center, Hydrometeorological Report 52 within Hydrological Modeling System

USDA, Natural Resources and Environment, Guidance for Conducting Analyses Under the Principles, Requirements, and Guidelines for Water and Land Related Resources Implementation Studies and Federal Water Resource Investments (DM 9500-13), January 2017

USDA, Natural Resources and Environment, Principles and Requirements for Federal Investments in Water Resources, March 2013

USDA, Natural Resources and Environment, Principles and Requirements for Federal Investments in Water Resources, Interagency Guidelines, March 2013

USDA Title 420 – General Manual, Part 401, Cultural Resources (Archaeological Historic Properties)

USDA Title 190 – Part 601 – National Cultural Resources Procedures Handbook

USDA Title 390-303 – Clarification and Instructions for the No-Action Alternative in Supplemental Watershed Rehabilitation Plans

REPORT PREPARERS

The Big Sandy 26 Supplemental Watershed Plan and Environmental Assessment was prepared by Schnabel Engineering, LLC with support from EA Engineering, Science, and Technology, Inc., Environmental Research Group, LLC (Formerly AmaTerra Environmental, Inc.), Headwaters Corporation, and the Texas NRCS staff. The document was reviewed and concurred with by staff specialists having responsibility for engineering, resource conservation, soils, biology, economics, geology, and contract administration. The in-house review was followed by a review by the NRCS National Water Management Center, and then an interagency and public review.

Table H identifies and lists the experience and qualifications of those individuals who were directly responsible for providing significant input to the preparation of this Supplemental watershed Plan-EA.

Appreciation is extended to many other individuals, agencies and organizations for their input, assistance, and consultation, without which this document would not have been possible. Several agencies such as the U.S. Army Corps of Engineers, U.S.D.A Forest Service, U.S. Fish and Wildlife Service and FEMA were considered as potential cooperating agencies in the development of the plan. However, none were invited to be a cooperating agency. The agencies can still be involved during the design phase of the project. There is nothing in this plan that is controversial or requires other agencies to participate as a cooperating agency.

Table H - Experience and Qualifications of Report Preparers

Name	Present Title and Years in Current Position	Education	Previous Experience in Years	Other
NRCS STAFF				
Mark Northcut, NRCS	Landscape Planning Staff Leader - 3	B.S. in Ag. Engineering	31	
Angela Moody, NRCS	State Cultural Resource Specialist - 6	B.A. in Anthropology (honors; Minor in Art History); M.A. Museum Science	18	
David Sullivan, NRCS	Civil Engineer – 5	B.S. in Civil Engineering	10	
Dawson Lilly, NRCS	Wildlife Biologist - 2	M.S. in Wildlife Biology	0	
David Buland, NRCS	Economist - 5	B.A. Economics M.A. Theology M.A. Economics	36	
L. Rex McAliley, NRCS	Wildlife Biologist - 2	Ph.D. in Biology	22	
CONSULTANTS				
J Ryan Collins, Schnabel Engineering, LLC	Senior Engineer – 4	B.S. Civil Engineering	11	P.E. in GA, TX, VA
Jeremy Young, Schnabel Engineering, LLC	Principal – 4	B.S. Civil Engineering M.S. Civil Engineering	19	P.E. in DE, MA, MD, NY, OK, PA, TX, VA, WV
Emily Gibson, Schnabel Engineering, LLC	Project Engineer – 4	B.S. Civil Engineering M.S. Civil Engineering M.E. Reliability Engineering	10	P.E. in DE, PA, VA
Rick Frithiof, Schnabel Engineering, LLC	Associate Engineer – 3	B.S. Civil Engineering	38	P.E. in AR, LA, NM, OK, TX
Jay Halligan, Schnabel Engineering, LLC	Project Scientist – 8	B.A. Geographical Analysis	10	
Edward Race, Schnabel Engineering, LLC	Project Engineer – 2	B.S. Civil Engineering Technology M.S. Geomatics	11	P.E. in PA
Chad Jones, Schnabel Engineering, LLC	Senior Staff Engineer – 5	B.S. Civil Engineering	0	P.E. in TX
Celine Patel, Schnabel Engineering, LLC	Staff Engineer – <1	B.S. Civil Engineering	0	EIT
Sal DeCarli, EA Engineering, Science, and Technology, Inc.	Project Manager / Scientist	M.S. Environmental Science and Policy	16	Certified Ecologist (CE)

Katherine Seikel, PhD, Environmental Research Group, LLC	Principal Investigator and Laboratory Manager - 6	B.A. Anthropology M.S. Anthropology (focus Archeology) PhD Archeology	15 (Total years in archaeology)	
Kurt Korfmacher, M.S., Environmental Research Group, LLC	Architectural Historian - 15	B.A. Anthropology M.S. Architectural Studies	19 (Total years in architectural history) 3 (Total years in archeology)	
George Oamek – Headwaters Corporation	Economist – 6 years	B.S., M.S. – Colorado State University; Ph.D. – Iowa State University	Agircultural Economist – 28 years	
Julia Grabowski – Headwaters Corporation	Geomorphology – 2 years	B.A. – Vanderbilt University M.S. – Colorado State University	0	

DISTRIBUTION LIST

Comments were requested on the Draft Supplemental Plan – EA from the following agencies and organizations. (NOTE – This list will be updated following NHQ Programmatic Review)

	Response Received on Draft Plan/EA
Federal Agencies	
Environmental Protection Agency	
U.S. Army Corps of Engineers	
U.S. Department of the Interior Fish and Wildlife Service	
Federal Emergency Management Agency	
U.S. Department of Agriculture U.S. Forest Service Farm Service Agency Rural Development	
Texas State Agencies	
Texas Commission on Environmental Quality (TCEQ) Dam Safety Division	
Local Sponsors	

APPENDIX A

LETTERS OF COMMENT AND NRCS RESPONSES TO COMMENTS RECEIVED ON DRAFT SUPPLEMENTAL PLAN-EA

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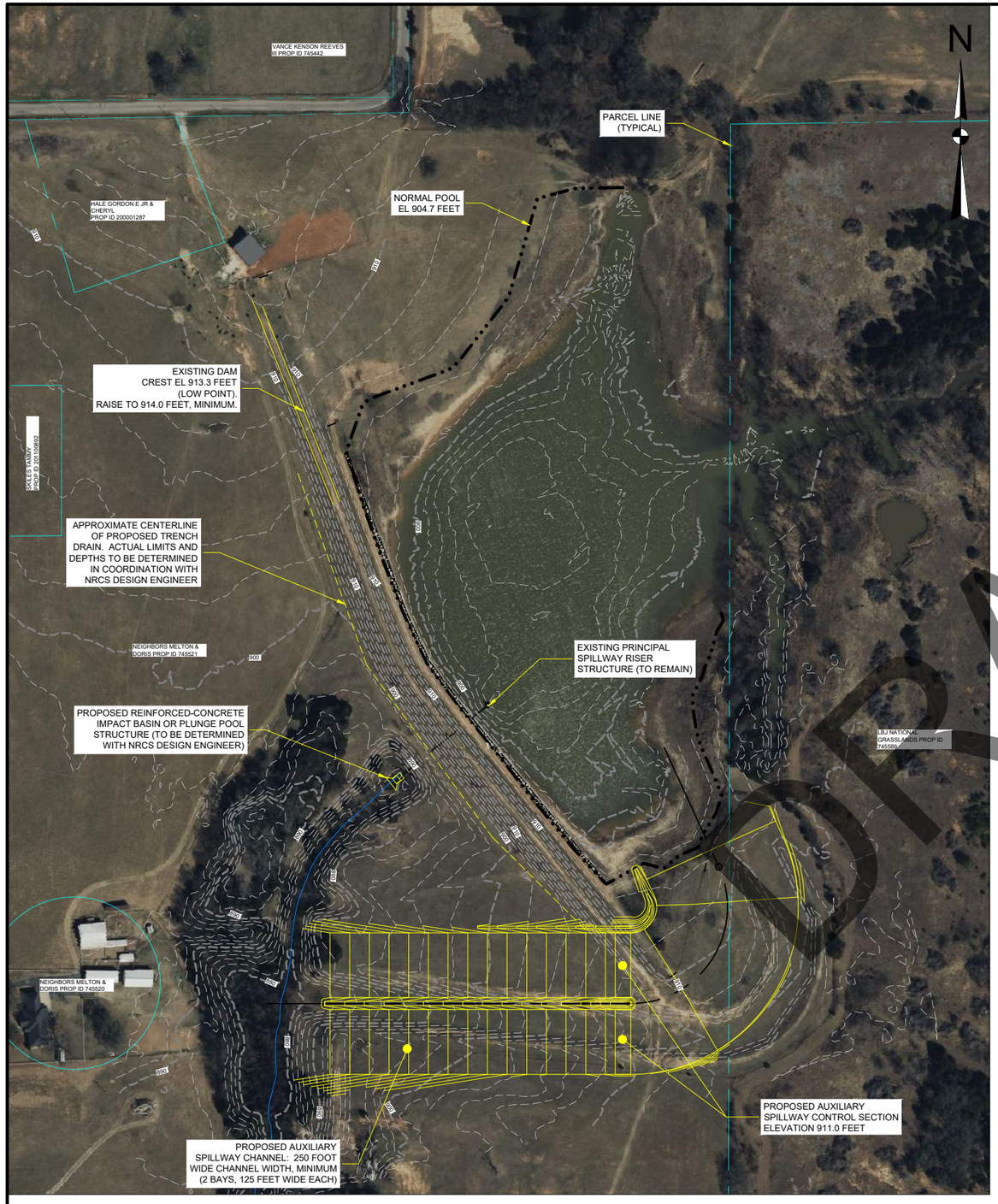
(Next pages reserved for review comments and responses)

(Next pages reserved for review comments and responses)

APPENDIX B

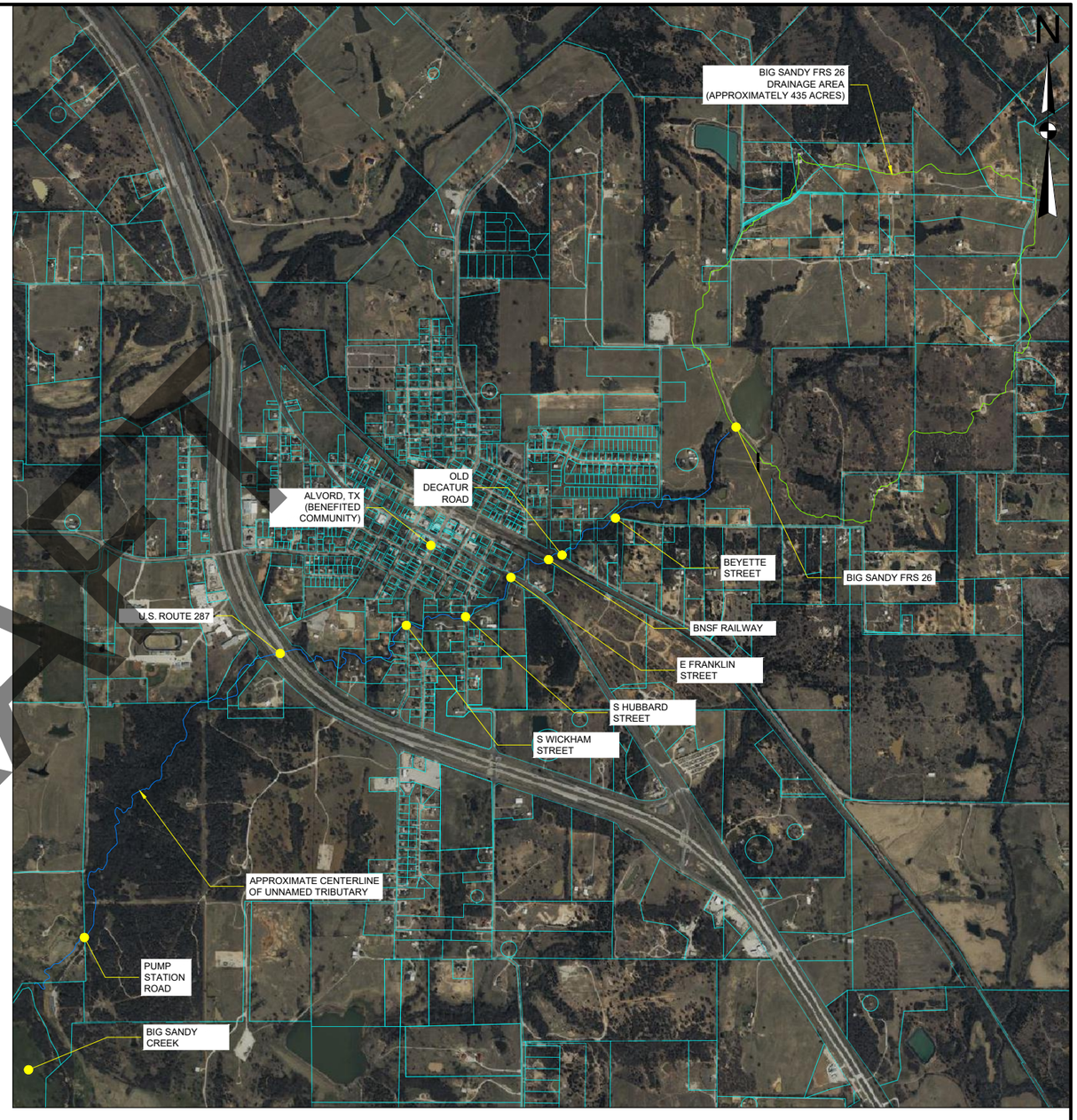
PROJECT MAP



PROPOSED ALTERNATIVE - SITE PLAN

SCALE: 1"=250'

0 250' 500'



BENEFITED COMMUNITY - ALVORD, TX

SCALE: 1"=2000'

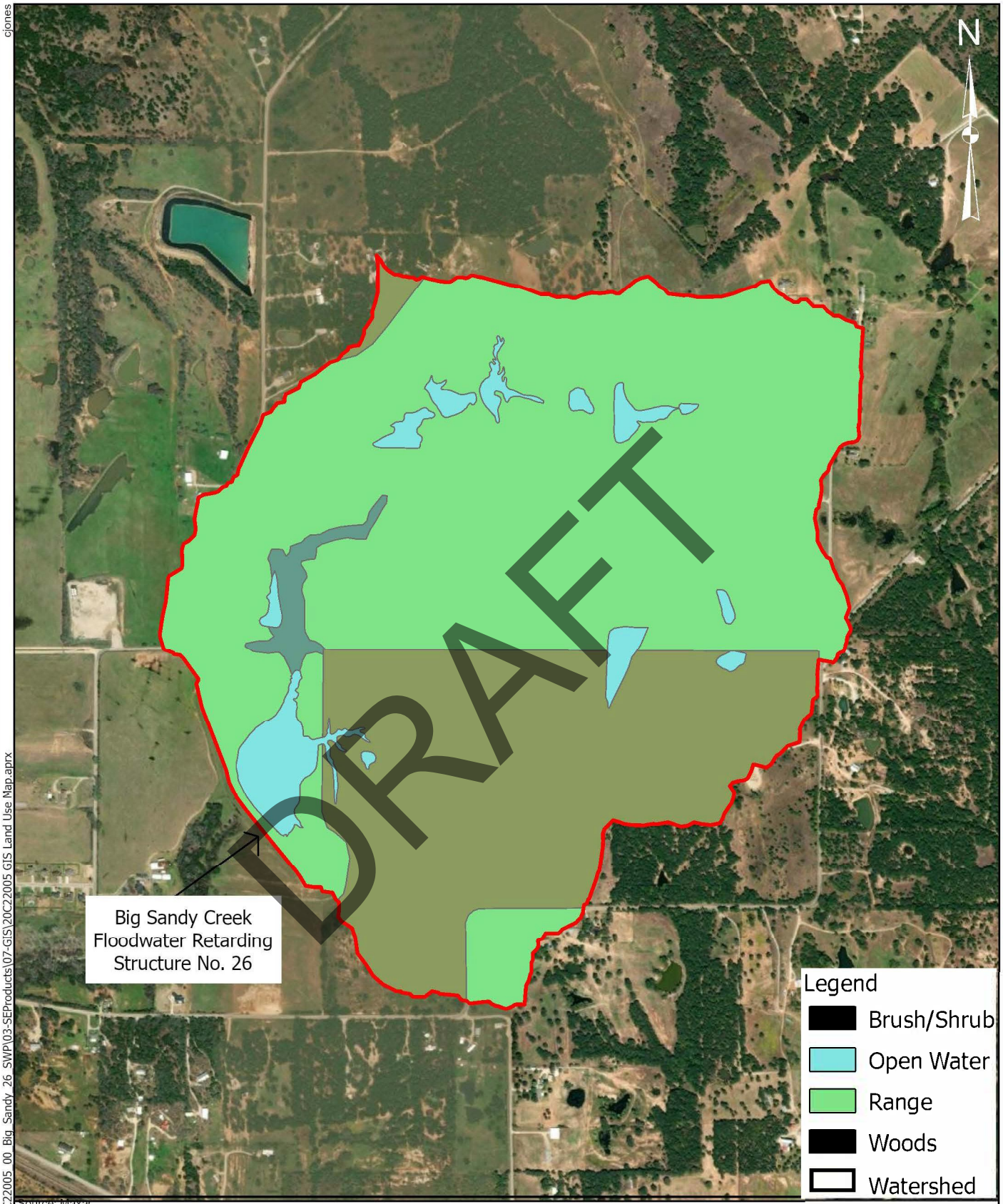
0 2000' 4000'

Schnabel ENGINEERING	BIG SANDY 26 PLAN-EA TSSWCB WISE COUNTY, TEXAS PROJECT NO. 20C22005.00	PROJECT MAP AND SITE PLAN ALTERNATIVE 3 (PREFERRED) FIGURE B

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CADIDRAWINGS\06-WORKING\FIG B-PROJECT MAP AND SITE PLAN.DWG

APPENDIX C

SUPPORT MAPS



Source: Maxar
Spatial Reference PCS: NAD 1983 2011 StatePlane Texas North Central FIPS 4202 FtUS
Land Cover Data: National Land Cover Data (USGS, 2016)

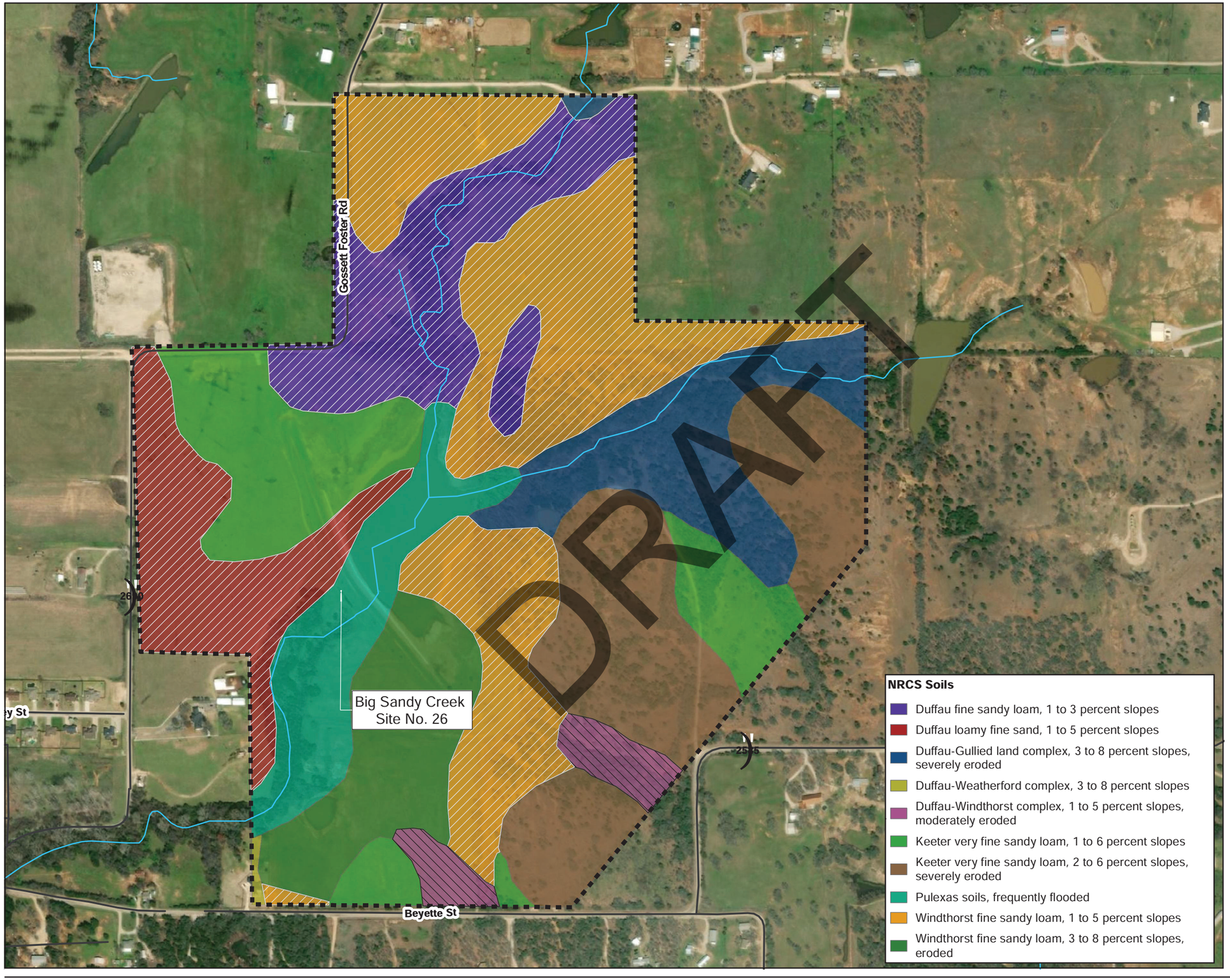
Schnabel ENGINEERING

BIG SANDY CREEK NO. 26
CITY OF ALVORD
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

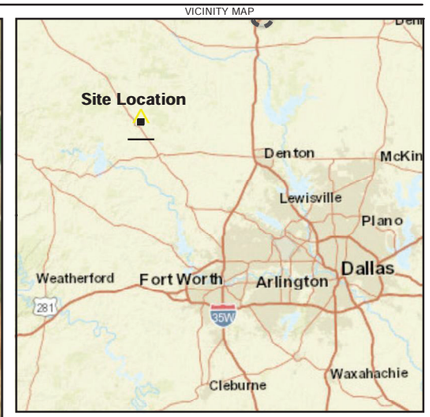
LAND USE
MAP

FIGURE C-1

Figure C-2



VICINITY MAP



Legend

- Stream
- Local Road
- Initial Study Area
- Prime Farmland
- Farmland of Statewide Importance

NRCS Soils

- Duffau fine sandy loam, 1 to 3 percent slopes
- Duffau loamy fine sand, 1 to 5 percent slopes
- Duffau-Gullied land complex, 3 to 8 percent slopes, severely eroded
- Duffau-Weatherford complex, 3 to 8 percent slopes
- Duffau-Windthorst complex, 1 to 5 percent slopes, moderately eroded
- Keeter very fine sandy loam, 1 to 6 percent slopes
- Keeter very fine sandy loam, 2 to 6 percent slopes, severely eroded
- Pulexas soils, frequently flooded
- Windthorst fine sandy loam, 1 to 5 percent slopes
- Windthorst fine sandy loam, 3 to 8 percent slopes, eroded

Map Date: 3/8/2021
Sources: Esri, DeLorme, HERE, USGS, et.al 2020; Esri, DigitalGlobe, GeoEye, et al 2020; TXDOT 2016; NRCS 2020; USGS 2019a
Projection: NAD 1983 2011 StatePlane Texas North Central FIPS 4202 FtUS

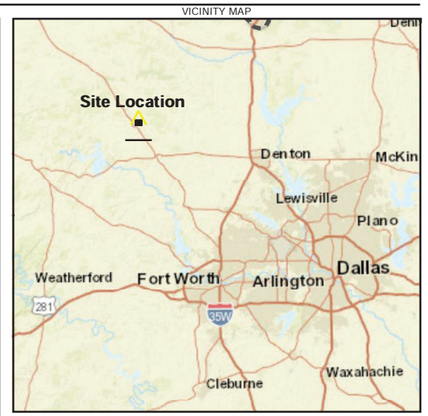
0 250 500 Feet

March 2021

Big Sandy Creek Site No. 26
Wise County, Texas

Figure C2
Soils - Initial Study Area

Figure C-3



Legend

- Stream
- Local Road
- Initial Study Area

NWI Classified Wetlands

- Freshwater Forested/Shrub Wetland
- Freshwater Pond Wetland
- Riverine Wetlands

Map Date: 3/8/2021
Sources: Esri, DeLorme, HERE, USGS, et.al 2020; Esri, DigitalGlobe, GeoEye, et al 2020; TXDOT 2016; USFWS 2020; USGS 2019a
Projection: NAD 1983 2011 StatePlane Texas North Central FIPS 4202 FtUS

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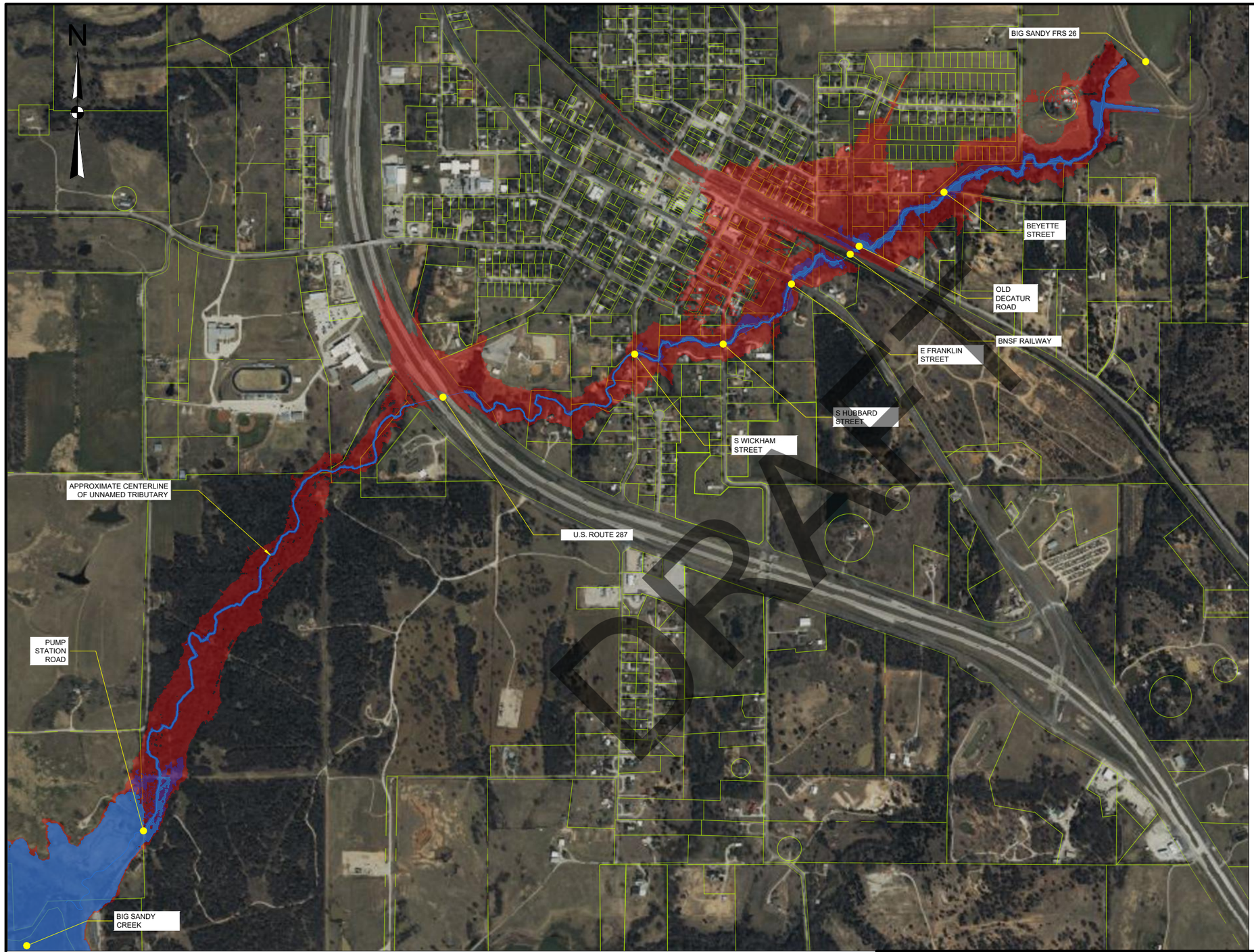
March 2021

Big Sandy Creek Site No. 26
Wise County, Texas

Figure C3
Hydrology - Initial Study Area



NOTES:

1. LIMITS SHOWN ARE CONSIDERED APPROXIMATE. THE ESTIMATED INUNDATION LIMITS ARE BASED ON HEC-RAS FLOOD ROUTING ANALYSES FOR THE SUBJECT HYDROLOGIC EVENT.
2. PARCEL DATA OBTAINED FROM BIS CONSULTANTS, JUNE 2023.
3. PEAK DISCHARGE FROM FRS 26 RESULTING FROM THE PMP WITH BREACH EVENT IS 14,670 CFS.
4. TAILWATER CONDITIONS IN BIG SANDY CREEK ARE BASED ON 10-YEAR FLOOD CONDITIONS (APPROXIMATELY 24,000 CFS) AND A BASEFLOW OF 100 CFS WAS USED IN THE MAIN TRIBUTARY FOR THE PMF EVENT.
5. TAILWATER CONDITIONS IN BIG SANDY CREEK ARE BASED ON 5-YEAR FLOOD CONDITIONS (APPROXIMATELY 17,780 CFS) AND A BASEFLOW OF 40 CFS WAS USED IN THE MAIN TRIBUTARY FOR THE 100-YEAR AND 500-YEAR STORM EVENTS.
6. AERIAL PHOTOGRAPHY REFERENCED FROM BING MAPS VIA AUTODESK CIVIL 3D WEB IMAGERY APPLICATION.

LEGEND

- INUNDATION LIMITS - 2-HOUR TEXAS LOCAL PMP, 75% PMF EVENT
- INUNDATION LIMITS - 24-HOUR, 100-YEAR FLOOD
- INUNDATION LIMITS - 24-HOUR, 500-YEAR FLOOD
- PARCEL LINE, TYPICAL

SCALE: 1"=1000'

0 1000' 2000'

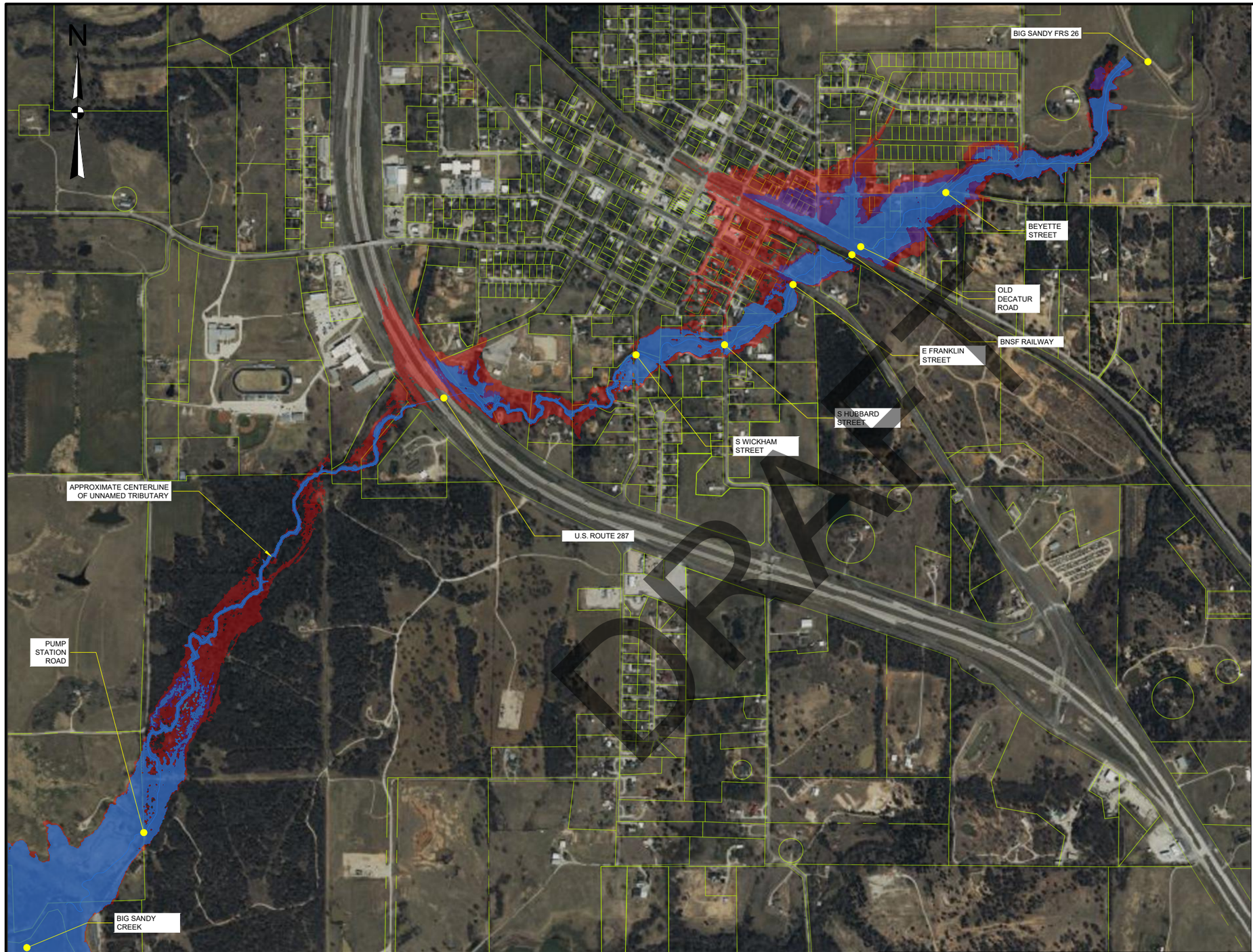
Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 1 - FWOFI
DOWNSTREAM FLOOD LIMITS

FIGURE C-4

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-INUNDATION LIMITS.DWG



NOTES:

1. LIMITS SHOWN ARE CONSIDERED APPROXIMATE. THE ESTIMATED INUNDATION LIMITS ARE BASED ON HEC-RAS FLOOD ROUTING ANALYSES FOR THE SUBJECT HYDROLOGIC EVENTS.
2. PARCEL DATA WAS OBTAINED FROM BIS CONSULTANTS, JUNE 2023.
3. PEAK DISCHARGE FROM THE DECOMMISSIONED FRS 26 RESULTING FROM THIS EVENT IS 3673 CFS FROM THE DECOMMISSIONED DAM DURING THE PMF.
4. TAILWATER CONDITIONS IN BIG SANDY CREEK ARE BASED ON 10-YEAR FLOOD CONDITIONS (APPROXIMATELY 24,000 CFS) AND A BASEFLOW OF 100 CFS WAS USED IN THE MAIN TRIBUTARY FOR THE PMF EVENT.
5. TAILWATER CONDITIONS IN BIG SANDY CREEK ARE BASED ON 5-YEAR FLOOD CONDITIONS (APPROXIMATELY 17,780 CFS) AND A BASEFLOW OF 40 CFS WAS USED IN THE MAIN TRIBUTARY FOR THE 100-YEAR AND 500-YEAR FLOOD EVENTS.
6. AERIAL PHOTOGRAPHY REFERENCED FROM BING MAPS VIA AUTODESK CIVIL 3D WEB IMAGERY APPLICATION.

LEGEND

- INUNDATION LIMITS - 2-HOUR TEXAS LOCAL PMP, 75% PMF EVENT
- INUNDATION LIMITS - 24-HOUR, 100-YEAR FLOOD
- INUNDATION LIMITS - 24-HOUR, 500-YEAR FLOOD
- PARCEL LINE, TYPICAL

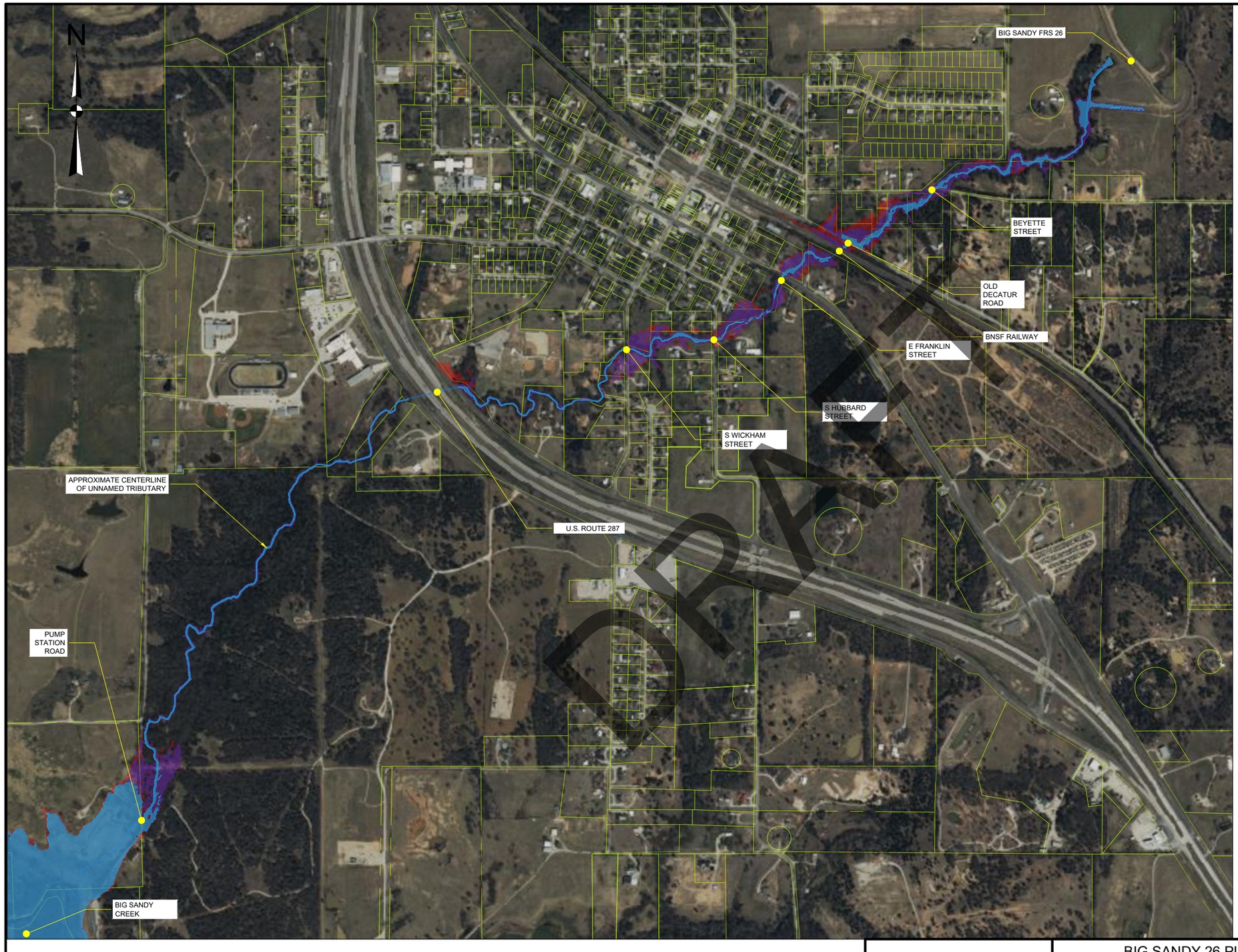
SCALE: 1"=1000'
0 1000' 2000'

Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 2 - DECOMMISSION
DOWNSTREAM FLOOD LIMITS
FIGURE C-5

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-INUNDATION LIMITS.DWG



NOTES:

1. LIMITS SHOWN ARE CONSIDERED APPROXIMATE. THE ESTIMATED INUNDATION LIMITS ARE BASED ON HEC-RAS FLOOD ROUTING ANALYSES FOR THE SUBJECT HYDROLOGIC EVENT.
2. PARCEL DATA OBTAINED FROM BIS CONSULTANTS, JUNE 2023.
3. PEAK DISCHARGE FROM FRS 26 RESULTING FROM THE PMF EVENT IS 716 CFS FROM THE AUXILIARY SPILLWAY.
4. TAILWATER CONDITIONS IN BIG SANDY CREEK ARE BASED ON 10-YEAR FLOOD CONDITIONS (APPROXIMATELY 24,000 CFS) AND A BASEFLOW OF 100 CFS WAS USED IN THE MAIN TRIBUTARY FOR THE PMF EVENT.
5. TAILWATER CONDITIONS IN BIG SANDY CREEK ARE BASED ON 5-YEAR FLOOD CONDITIONS (APPROXIMATELY 17,780 CFS) AND A BASEFLOW OF 40 CFS WAS USED IN THE MAIN TRIBUTARY FOR THE 100-YEAR AND 500-YEAR FLOOD EVENTS.
6. AERIAL PHOTOGRAPHY REFERENCED FROM BING MAPS VIA AUTODESK CIVIL 3D WEB IMAGERY APPLICATION.

LEGEND

- INUNDATION LIMITS - 2-HOUR TEXAS LOCAL PMP, 75% PMF EVENT
- INUNDATION LIMITS - 24-HOUR, 100-YEAR FLOOD
- INUNDATION LIMITS - 24-HOUR, 500-YEAR FLOOD
- PARCEL LINE, TYPICAL

SCALE: 1"=1000'

0 1000' 2000'

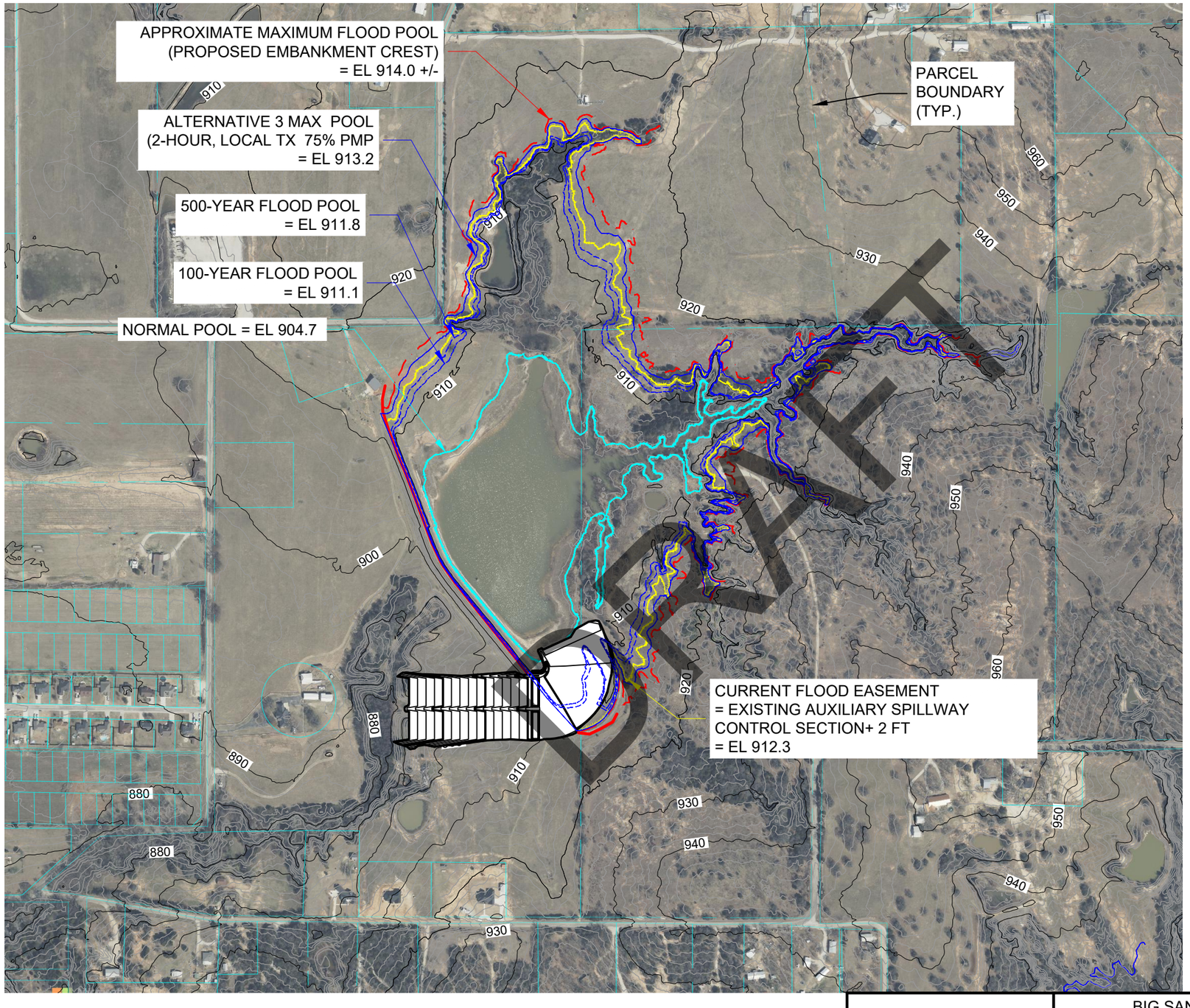
Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALT 3 - REHABILIATION
DOWNSTREAM FLOOD LIMITS

FIGURE C-6

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-INUNDATION LIMITS.DWG



NOTES:

1. LiDAR BARE EARTH DEM (TOPOGRAPHY) WAS OBTAINED FROM THE USGS.GOV NATIONAL MAP DOWNLOAD CLIENT AT https://viewer.nationalmap.gov/basic/
2. ALL ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
3. AERIAL PHOTOGRAPHY WAS OBTAINED FROM 2023 MICROSOFT CORPORATION, 2023 MAXAR, CNES (2023) DISTRIBUTION AIRBUS DS.
4. PARCEL DATA FOR WISE COUNTY OBTAINED FROM BIS CONSULTANTS JUNE 2023.
5. THE MAXIMUM FLOOD POOL FOR ALTERNATIVE 3 IS APPROXIMATELY 914.0 FEET BASED ON THE PROPOSED MINIMUM ELEVATION OF THE EMBANKMENT CREST. ADDITIONAL REFINEMENT OF THE SPILLWAY LAYOUT AND MINIMUM EMBANKMENT CREST WILL OCCUR DURING THE FINAL DESIGN PHASE. THE MINIMUM CREST ELEVATION MAY BE INCREASED SLIGHTLY (LESS THAN 1 FOOT) TO ENSURE THAT ADEQUATE FREEBOARD IS PROVIDED FOR ALL REQUIRED FLOOD EVENTS. ADDITIONAL DISCUSSION IS PRESENTED IN APPENDIX D - INVESTIGATIONS AND ANALYSES.

Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 3 - REHABILITATION
UPSTREAM FLOOD LIMITS

FIGURE C-7

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CADDRAWINGS\06-WORKING\FIGS-OVERALL FLOOD POOL.DWG

NEIGHBORS MELTON & DORIS PROP ID 745520

SKILES TAMMY PROP ID 201100892

BREACH EXISTING EMBANKMENT (BOTTOM ELEVATION VARIES FROM 880 DOWNSTREAM TO 892 UPSTREAM

APPROXIMATE LIMITS OF DISTURBANCE

HALE GORDON E JR & CHERYL PROP ID 200001287

EXISTING PRINCIPAL SPILLWAY RISER AND CONDUIT (TO BE REMOVED)

RESTORE ORIGINAL STREAM CHANNEL AND FLOODPLAIN

VANCE KENSON REEVES III PROP ID 745442

NEIGHBORS MELTON & DORIS PROP ID 745521

LBJ NATIONAL GRASSLANDS PROP ID 745589

NOTES:

1. TOPOGRAPHIC DATA IS FROM A SURVEY PERFORMED BY JQ INFRASTRUCTURE, DATED 08-21-2020.
2. THE HORIZONTAL DATUM IS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM 1983 (2011).
3. THE VERTICAL DATUM IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. AERIAL PHOTOGRAPHY WAS OBTAINED FROM 2020 MICROSOFT CORPORATION, 2020 MAXAR, CNES (2020) DISTRIBUTION AIRBUS DS.

PLAN

SCALE: 1"=200'

0 200' 400'

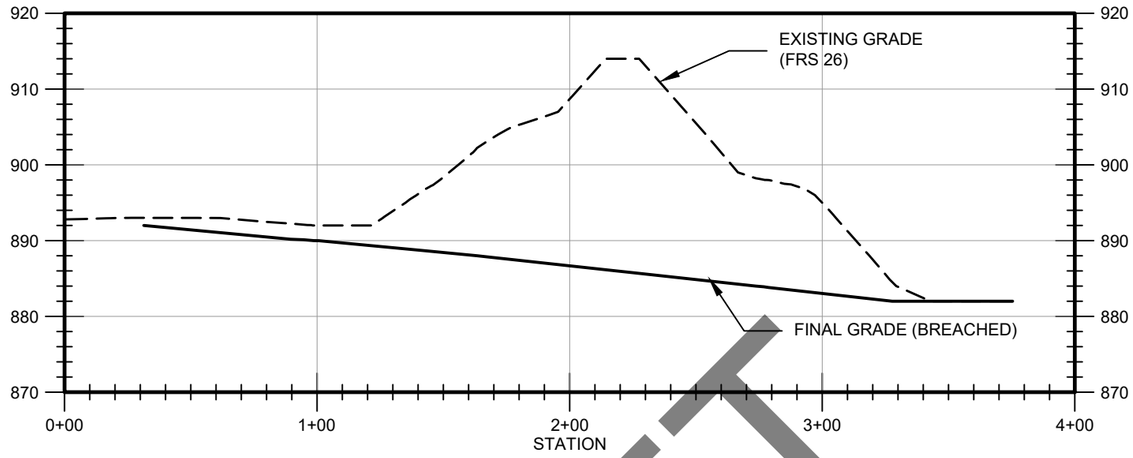
Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 2
DECOMMISSIONING
PLAN VIEW

FIGURE C-8

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-ALT2.DWG

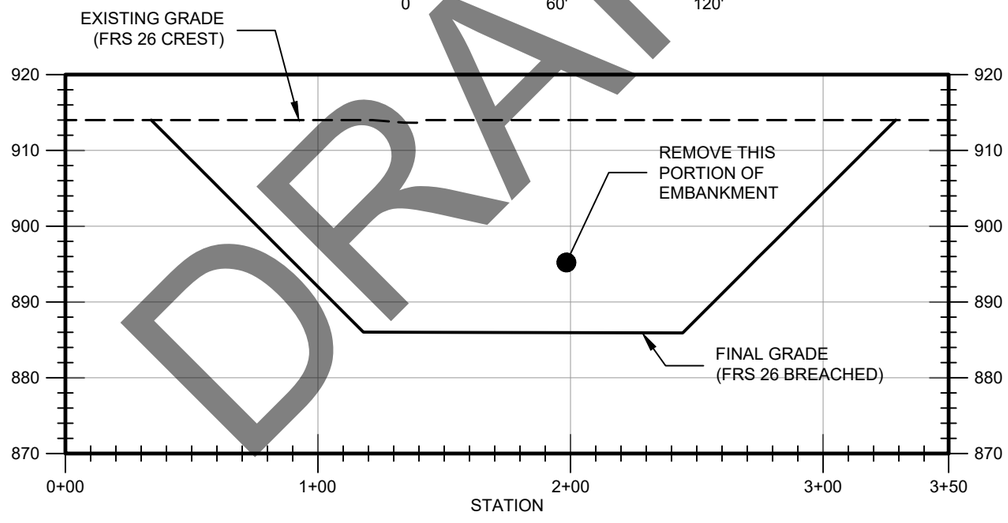


CROSS-SECTION OF DECOMMISSIONING BREACH

VERT. SCALE (3x EXAGGERATION)

HORZ. SCALE: 1"=60'

0 60' 120'



PROFILE OF DECOMMISSIONING BREACH

VERT. SCALE (3x EXAGGERATION)

HORZ. SCALE: 1"=60'

0 60' 120'

Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 2
DECOMMISSIONING
PROFILE AND SECTION
FIGURE C-9

NEIGHBORS MELTON & DORIS PROP ID 745520

EXTEND PRINCIPAL SPILLWAY CONDUIT AND CONSTRUCT REINFORCED-CONCRETE IMPACT BASIN OR PLUNGE POOL

SKILES TAMMY PROP ID 201100892

PROPOSED SPLITTER BERM

EXISTING 24-IN AWWA C-301 PCCP INV. OUT 881.3 (TO REMAIN IN SERVICE)

ESTIMATED LIMITS OF TRENCH DRAIN INSTALLATION

APPROXIMATE LIMITS OF DISTURBANCE

RAISE MINIMUM EMBANKMENT CREST TO EL. 914.0 +/-

PROPOSED 30-FT LONG CONTROL SECTION EL. 911.0 (RAISED FROM EL. 910.3)

EXISTING BARBED WIRE FENCE TO BE REPLACED IN KIND

HALE GORDON E JR & CHERYL PROP ID 200001287

APPROXIMATE CENTERLINE OF PROPOSED AUXILIARY SPILLWAY (2 125-FOOT WIDE BAYS SHOWN)

EXISTING PRINCIPAL SPILLWAY RISER TO REMAIN IN SERVICE

EXISTING RIPRAP WAVE BERM.

VANCE KENSON REEVES III PROP ID 745442

EDGE OF WATER AT TIME OF SURVEY (EL 903.5, TYP.)

BIG SANDY 26 FRS NORMAL POOL ELEVATION 904.7 FEET

NEIGHBORS MELTON & DORIS PROP ID 745521

LBJ NATIONAL GRASSLANDS PROP ID 745589

NOTES:

1. TOPOGRAPHIC DATA IS FROM A SURVEY PERFORMED BY JQ INFRASTRUCTURE, DATED 08-21-2020.
2. THE HORIZONTAL DATUM IS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM 1983 (2011).
3. THE VERTICAL DATUM IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. AERIAL PHOTOGRAPHY WAS OBTAINED FROM 2020 MICROSOFT CORPORATION, 2020 MAXAR, CNES (2020) DISTRIBUTION AIRBUS DS.
5. IF MODIFICATIONS TO THE UPSTREAM SLOPE ARE PERFORMED, EXISTING RIPRAP SHALL BE STOCKPILED AND REPLACED TO THE ORIGINAL LIMITS AND CONDITIONS.

PLAN

SCALE: 1"=200'

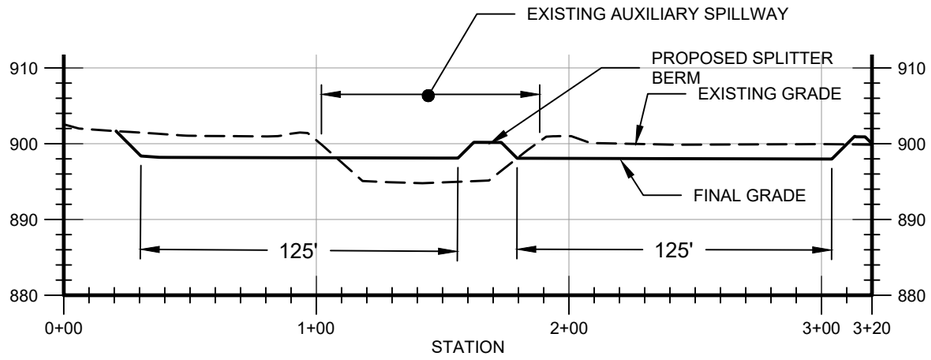
0 200' 400'

Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 3
STRUCTURAL REHABILITATION
PLAN VIEW
FIGURE C-10

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-ALT3.DWG

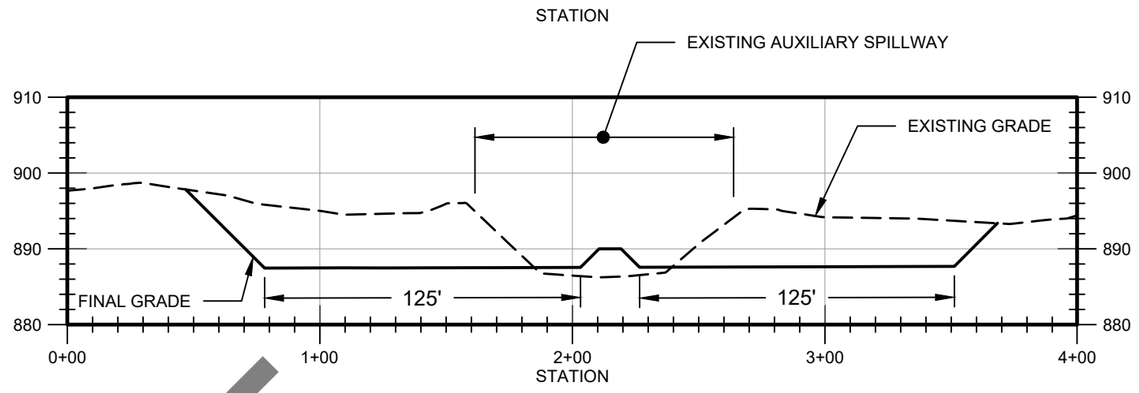


AUXILIARY SPILLWAY - SECTION AT 9+00

VERT. SCALE (3x EXAGGERATION)

HORZ. SCALE: 1"=60'

0 60' 120'

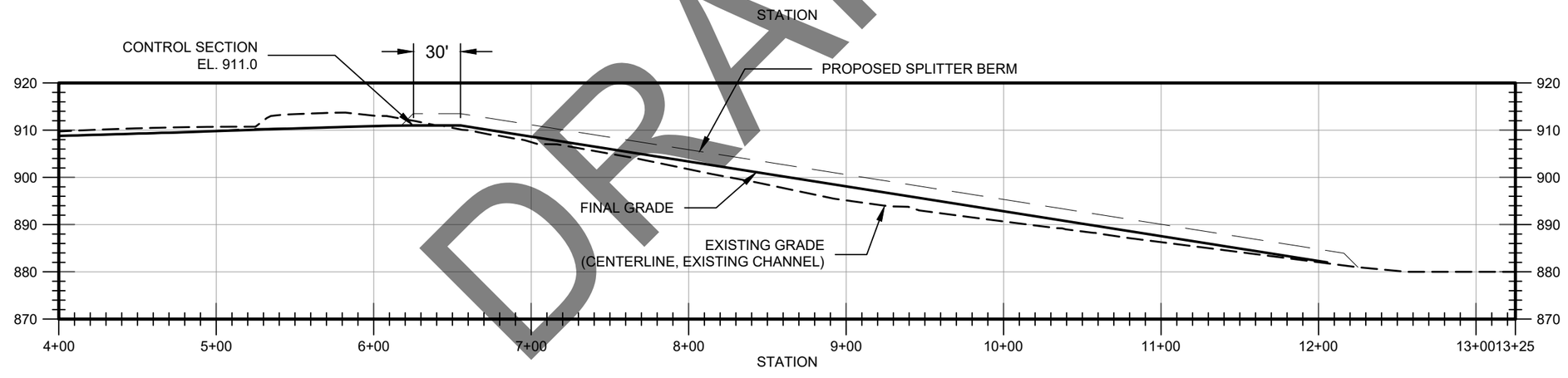


AUXILIARY SPILLWAY - SECTION AT 11+00

VERT. SCALE (3x EXAGGERATION)

HORZ. SCALE: 1"=60'

0 60' 120'



AUXILIARY SPILLWAY - PROFILE

VERT. SCALE (3x EXAGGERATION)

HORZ. SCALE: 1"=80'

0 80' 160'

NOTES:

1. THE SPILLWAY LAYOUT IS CONSIDERED APPROXIMATE. ADDITIONAL GEOTECHNICAL SUBSURFACE AND LABORATORY DATA ARE REQUIRED TO FINALIZE THE SPILLWAY LAYOUT. THE FINAL SPILLWAY LAYOUT WILL BE DEVELOPED IN COORDINATION WITH THE NRCS DESIGN ENGINEER.

2. ADJUSTMENTS TO THE SPILLWAY WIDTH MAY BE REQUIRED FOLLOWING GEOTECHNICAL EVALUATION, RESOLUTION OF LAND RIGHTS, AND DISCUSSION WITH NRCS HYDROLOGIC AND HYDRAULIC ENGINEERS. ADJUSTMENTS TO THE FINAL GRADE AND PROFILE MAY BE REQUIRED TO ENSURE THE SPILLWAY IS ENTIRELY IN CUT MATERIAL.

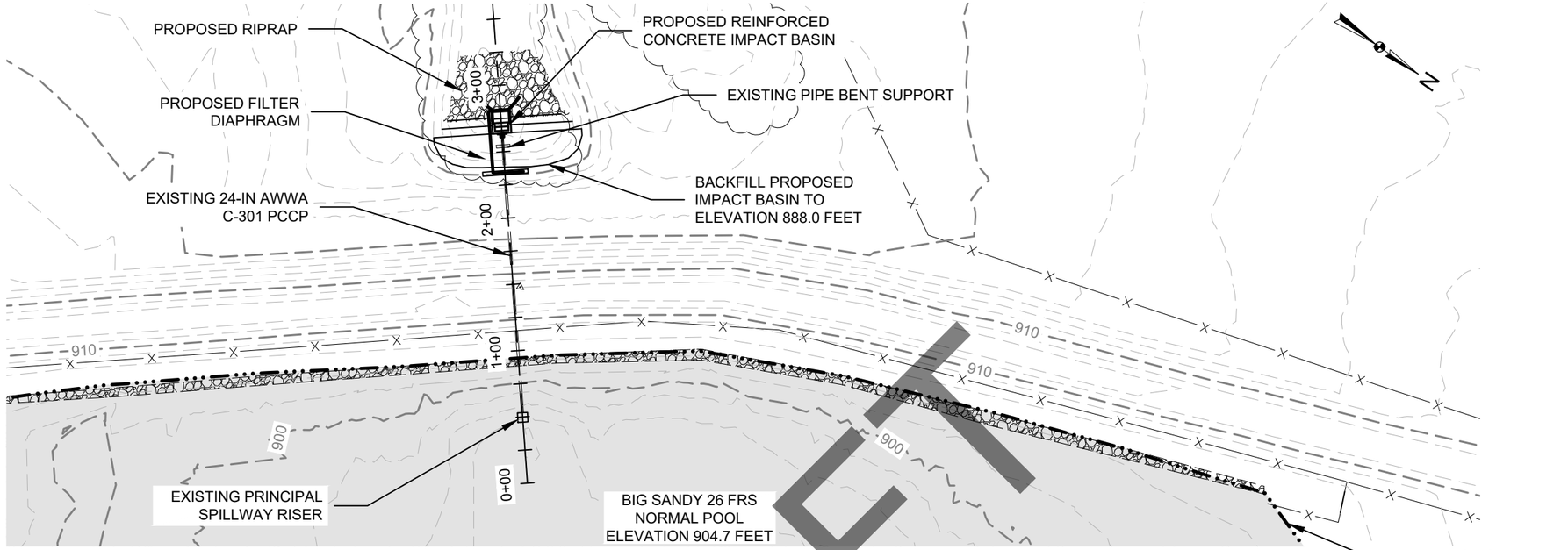
Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 3
STRUCTURAL REHABILITATION
PROFILE AND SECTIONS

FIGURE C-11

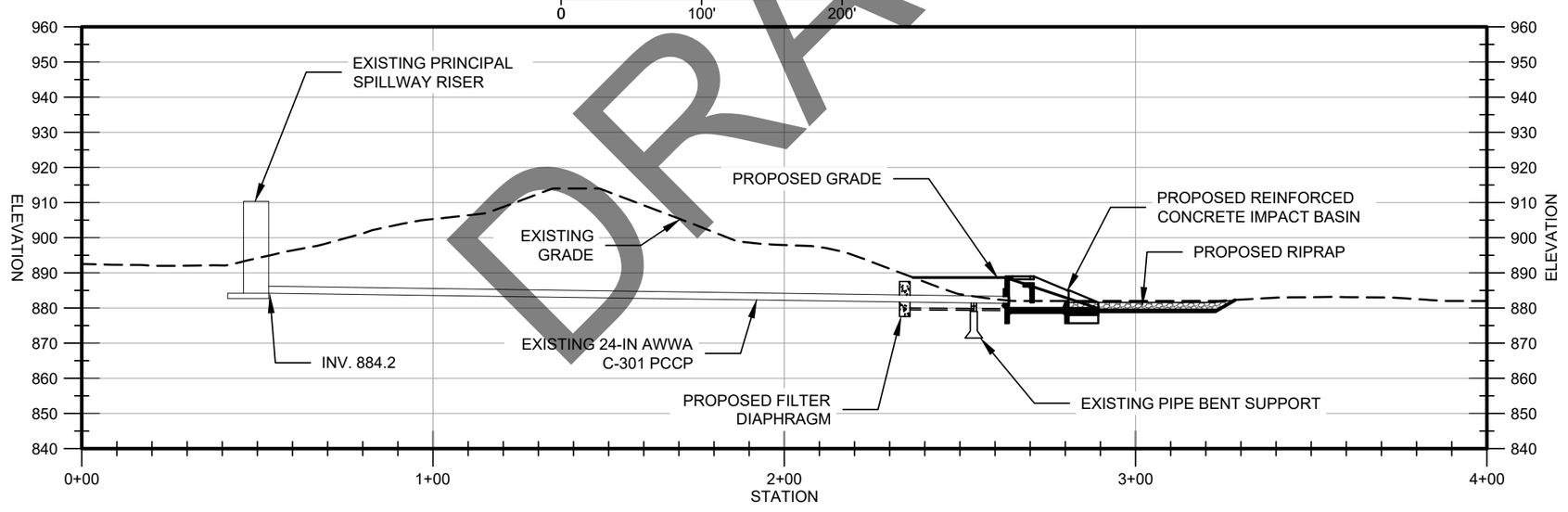
O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-ALT3.DWG



PRINCIPAL SPILLWAY - PLAN

SCALE: 1"=100'

0 100' 200'



PRINCIPAL SPILLWAY - SECTION

HORZ. & VERT. SCALE: 1"=40'

0 40' 80'

NOTES:

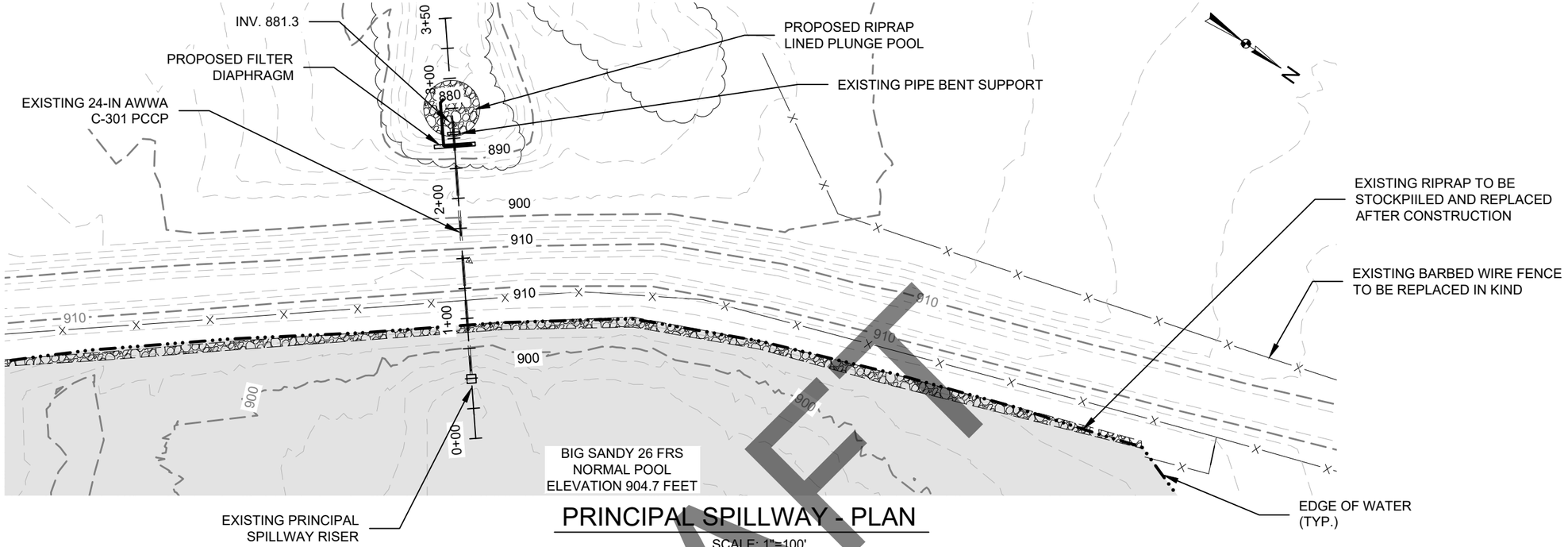
1. TOPOGRAPHIC DATA IS FROM A SURVEY PERFORMED BY JQ INFRASTRUCTURE, DATED 08-21-2020.
2. THE HORIZONTAL DATUM IS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM 1983 (2011).
3. THE VERTICAL DATUM IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
4. LIMITS SHOWN ARE APPROXIMATE. ACTUAL LOCATION OF DIAPHRAGM FILTER AND IMPACT BASIN SUBJECT TO CHANGE FOLLOWING DISCUSSIONS WITH NRCS DESIGN ENGINEERS.

Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 3
IMPACT BASIN
PLAN AND PROFILE
FIGURE C-12

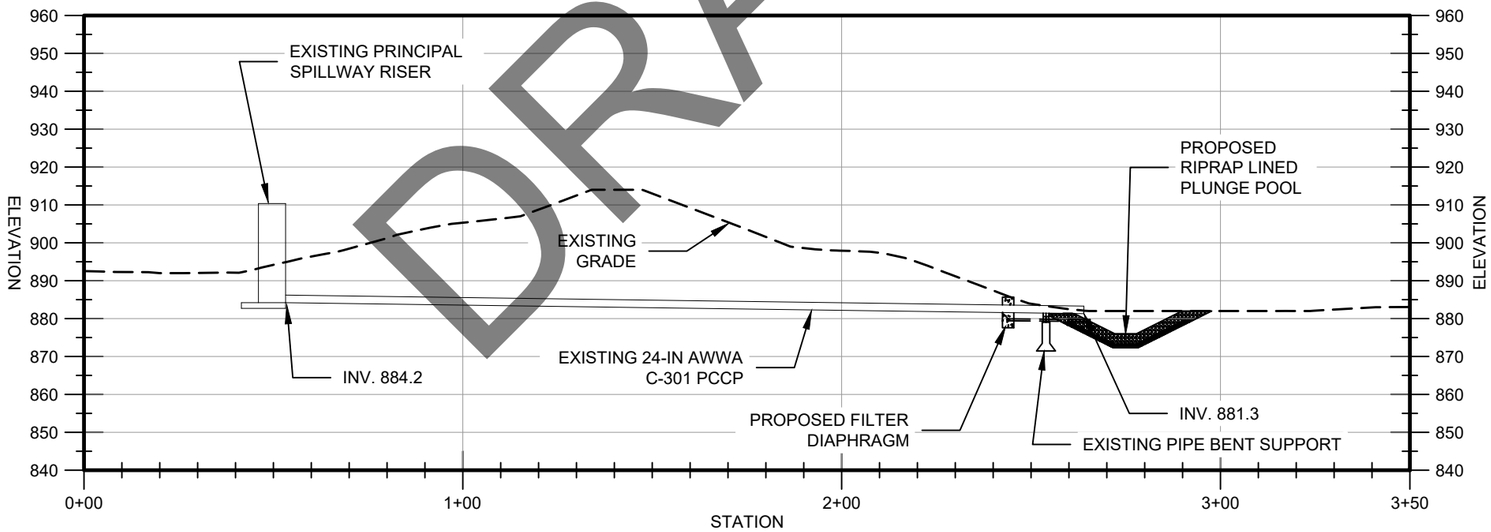
O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-PRINCIPAL SPILLWAY PLAN & PROFILE-IMPACT BASIN.DWG



PRINCIPAL SPILLWAY - PLAN

SCALE: 1"=100'

0 100' 200'



PRINCIPAL SPILLWAY - SECTION

HORZ. & VERT. SCALE: 1"=40'

0 40' 80'

NOTES:

1. TOPOGRAPHIC DATA IS FROM A SURVEY PERFORMED BY JQ INFRASTRUCTURE, DATED 08-21-2020.
2. THE HORIZONTAL DATUM IS REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE (4202), NORTH AMERICAN DATUM 1983 (2011).
3. THE VERTICAL DATUM IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

Schnabel ENGINEERING

BIG SANDY 26 PLAN-EA
TSSWCB
WISE COUNTY, TEXAS
PROJECT NO. 20C22005.00

ALTERNATIVE 3
PLUNGE POOL
PLAN AND PROFILE
FIGURE C-13

O:\AUSTIN\2020\20C22005_00_BIG_SANDY_26_SWP\03-SEPRODUCTS\08-CAD\DRAWINGS\06-WORKING\FIGS-PRINCIPAL SPILLWAY PLAN & PROFILE-PLUNGE POOL.DWG

Figure C-14

National Flood Hazard Layer FIRMette

FEMA

97°41'10"W 33°21'54"N

97°40'32"W 33°21'24"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/29/2021 at 12:56 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX D

INVESTIGATIONS AND ANALYSES REPORT

Appendix D - Investigations and Analyses Report for the Planning of Floodwater Retarding Structure No. 26 of the Big Sandy Creek Watershed Supplement No. 6 Wise County, Texas

Table of Contents

Introduction

The planning team consisted of the following entities:

- USDA Natural Resources Conservation Service (NRCS) Texas - Lead Federal Agency;
- Schnabel Engineering, LLC (Schnabel) – Prime Contractor;
- EA Engineering, Science, and Technology, Inc., PBC (EAEST) - Environmental Sub-consultant;
- Environmental Resources Group (ERG) Formerly, AmaTerra Environmental, Inc. (AmaTerra) – Cultural Resources Sub-consultant
- Headwaters Corporation (Headwaters) – Economics Sub-consultant.

The planning team members contributed to the Plan-EA at various stages of the development. The Plan-EA.

Planning Engineering

Purpose

This Investigations and Analyses Report (Appendix D) summarizes the investigations and analyses completed for the dam rehabilitation planning engineering of Big Sandy Creek FRS No. 26 (FRS 26). This section describes the activities performed which formed the basis for the findings presented in the Plan-EA. Additional

The basis for the planning engineering investigations and analyses are current dam safety criteria and standards, including, but not limited to, the following:

- GI-364 – Hydrologic and Hydraulic Analyses (TCEQ).
- Texas Probable Maximum Precipitation Study
- Title 210-650-B – Texas Hydrology Supplement (SCS).
- National Engineering Handbook, Part 630, Hydrology (NRCS).
- Title 210-60, Earth Dams and Reservoirs (NRCS 2019).

Existing Conditions and Deficiencies

The planning team conducted a series of investigations to evaluate the existing condition and adequacy of FRS 26 with respect to hydraulic capacity, spillway integrity, slope stability, and other relevant engineering considerations. Schnabel performed the following investigations and analyses of FRS 26 to characterize the existing condition and deficiencies:

- Hydrologic and hydraulic analyses;
    - Storm routing analyses (HEC-HMS, SITES)
    - Flood routing analyses (HEC-RAS)
    - Spillway integrity analyses (SITES)

    - Consequence estimation and Flood Damage estimation (LifeSim)
- Geotechnical analyses
    - Slope stability analyses (GeoStudio Slope/W)
    - Sediment Yield
- On-Site Evaluations
    - Closed-circuit television (CCTV) inspection of the existing principal spillway conduit and riser (July 2021)
    - Visual inspection of FRS 26 (July 2021)
    - Topographic and Bathymetric Site Survey
- General
    - Review of Available Documents provided by NRCS and Sponsors.
    - Gathering of data such as GIS parcel files (BIS Consultants 2023, Wise County 2020), National Structure Inventory (NSI) data, review of available aerial photographs (Bing, Google Maps), Soil Survey Data (USDA), Flood hazard maps (FEMA), and other resources to support the development of this plan.

Based on the results of the aforementioned investigations and analyses, FRS 26 does not comply with Texas law for high hazard dams.

Notable Deficiencies include:

1. The hydrologic and hydraulic analyses revealed that FRS 26 does not have sufficient capacity to safely store or pass the Texas Commission on Environmental Quality (TCEQ) mandated design storm for a small, high hazard dam.

2. The dam lacks an internal filter drain.

3. The plunge pool lacks adequate riprap cover.

4. Repairs to the metalwork on the existing riser are required.

5. The upstream slope appears to lack an acceptable factor of safety during the rapid drawdown condition.

Hydrologic and Hydraulic Analyses

A hydrologic and hydraulic analysis of the Big Sandy 26 watershed and of the Big Sandy 26 dam was performed using a HEC-HMS watershed model to establish inflow hydrographs for various storm events using the latest soils and land use maps, drainage area delineations, time of concentrations, and rainfall data. Delineation of the watershed was performed using a GIS-based approach that uses a digital elevation model (DEM). The DEM was obtained from the Texas Natural Resources Information System (2019). The watershed is a single sub-basin that is approximately 5,600 feet long and approximately 4,500 feet wide. The Runoff Curve Number (CN) for the Big Sandy 26 watershed was computed within a GIS environment using digital soil and land cover data, in conjunction with the digital watershed delineation.

Soils data were obtained from the online NRCS Web Soil Survey application (accessed 2020) and a hydrologic soil group (HSG) was assigned to each geospatial soil map unit within the watershed. Land Use data were obtained from the National Land Cover Database of 2019 (NLCD2019). The spatial soil and land cover data were combined, and CN values were assigned to each unique combination of soil and land cover codes using a custom CN lookup table. This table was derived from source material in the National Engineering Handbook (NEH). The time of concentration for the Big Sandy 26 watershed was determined through the segmental travel time approach consistent with the hydrologic analyses for other nearby NRCS projects and precipitation data was taken from the statewide Probable Maximum Precipitation (PMP) Study which was developed by Applied Weather Associates, LLC, in September 2016, and subsequently adopted by Texas Commission on Environmental Quality (TCEQ).

Storm routing and flood routing analyses were performed to aid in preparation of the plan. Storm routing analyses were performed in HEC-HMS (Hydrologic Engineering Center's Hydraulic Modeling System, USACE 2023) and SITES (USDA-NRCS). HEC-HMS was used initially to import the Texas Statewide Probable Maximum Precipitation (PMP) grid values for the FRS 26 basin and generate point precipitation values for the subject basin. The HEC-HMS models were used to identify the controlling PMP storm event for FRS 26 based on Texas dam safety requirements. SITES models were also developed to evaluate the NRCS 6-, 12- and 24-hour Freeboard Hydrograph (FBH), the 6-, 12 and 24-hour Stability Design Hydrograph (SDH) and the Principal Spillway Hydrograph (PSH) to evaluate compliance with NRCS standards. The Hydrologic Engineering Center's River Analysis System (HEC-RAS) was utilized to simulate flooding downstream of FRS 26. The HEC-RAS modeling was limited to frequency storm routings to support the economic analyses.

A detailed hydrologic and hydraulic analyses report prepared by Schnabel dated February 7, 2022 is provided in Appendix E which includes additional details and figures. The following section provides an addendum to the report based on several revisions made to the analyses late in the planning phase.

Hydrologic and Hydraulic Analyses - Addendum

The hydrology and hydraulics report (Schnabel 2022 – Appendix E) documented the storm routing results of alternatives that had been formulated at that time, which were based on assumptions regarding their feasibility. Substantial revision to the hydrologic and hydraulic analyses was required due to unforeseen issues and contractual changes to the project that occurred long after the report was completed. Due to schedule and budget constraints, the report published at that time has not been revised. Instead, this entry shall serve as an addendum to the February 2022 H&H report and summarize the pertinent revisions and how those revisions impacted the plan. Revised, as well as new calculations and hydrologic and hydraulic modeling data are provided in Appendix E. The following sub-sections summarize the significant revisions made to the hydrologic and hydraulic analyses and potential issues to be addressed during the design phase.

New Residential Structure on Right Abutment and Spillway Width Considerations

A new residential parcel was created on the right abutment of the dam sometime during late 2021 or early 2022. The construction of a residential structure on the new parcel was completed likely during the late summer or fall of 2022 (well after the 2022 H&H report was completed). The location of the home and the site grading that were performed caused the concept of raising the crest of the FRS 26 embankment to elevation 915.0 to be no longer a reasonable alternative. Therefore, the structural alternatives described in the 2022 H&H report are no longer valid. As such, the auxiliary spillway width was re-analyzed with consideration for the TCEQ-mandated controlling design flood event; the 2-hour Texas Local 75 percent PMP. The HEC-HMS storm routing models were revised in HEC-HMS v4.8. An auxiliary spillway width of 250 feet at control section elevation 911.0 feet was analyzed, and represents a practicable iteration of Alternative 3 – Structural Rehabilitation, suitable for carrying forward to detailed analysis. We note that only the controlling TCEQ PMP event as identified in the February 2022 H&H report was considered. The 250 foot wide spillway width resulted in a calculated peak water surface elevation of 913.3 feet (the approximate elevation of the crest of the existing embankment) during the Texas required design flood event. This new spillway configuration represents the primary measure described under Alternative 3 - Structural Rehabilitation. (Note that in the HEC-HMS and HEC-RAS models, this condition is labeled as "Alt 1"). This revised alternative was then carried forward to downstream flooding analyses to assess the consequences and to estimate flood damages. A conceptual grading plan of the revised spillway was developed for the purposes of generating figures and exhibits to support this plan (See Appendices B and C).

Frequency Storm Runoff Curve Number

The Runoff Curve Number (RCN) for all frequency storm events (FWOFI, Decommissioning, and Alternative 3) was modified to 84 (From 60, Antecedent Runoff Condition ARC II). Based on the development that occurred within the watershed just during the time the plan was under development (e.g. new house on right abutment), the planning team assumed that over the 100-year evaluated life, development within the basin may be likely. The increased runoff curve number simulates an assumed, future developed watershed and reduced infiltration (e.g. slightly greater than ARC II) to provide a conservative estimate of the frequency storm event consequences. The Texas PMP events still relied on an ARC III curve number of 84; and the NRCS flood routings are based on an ARC II curve number of 60. During the design phase, further refinement of the future projected curve number should be performed in coordination with the NRCS NDCSMC to apply a reasonable degree of conservatism to the spillway final design. Additional discussion surrounding detailed refinement of the auxiliary spillway channel is discussed in the following bullets. The revised HEC-HMS storm routing summary is provided in Appendix E.

Ratio of PMF versus PMP

The fraction of PMF ratio applied to the rainfall total on the revised models. This was based

on review of the TCEQ requirements for identifying the critical storm duration, which required applying the ratio to the precipitation rather than the runoff (GI-364, TCEQ). The revised hydrographs were carried forward into the HEC-RAS flood models. Minor differences in peak inflow (on the order of 100 cfs) resulted from this change. During the final design phase, when routing the Texas design storm events, the 75 percent ratio should be applied to runoff rather than precipitation.

Breach Inundation Analyses

Following receipt of the NWMC comments on the preliminary draft plan, a contractual amendment was executed to include dam breach inundation analyses in Schnabel's scope of services in order to adequately address the comments. Substantial modifications to the previously developed HEC-RAS flood models were required in order to simulate the breach events. The revised flood models were executed using HEC-RAS v6.4. The breach inundation models required application of the Saint Venant Equations (full, stricter momentum) to simulate the breach event and resulting flood waves with reliable depth and velocity results. To achieve stable computations with reliable results, the necessary revisions included modifications to the terrain, geometry, boundary conditions, computational mesh, crossings, computation options and tolerances, time steps, and other miscellaneous model parameters. Due to both the spillway widening described in item 1 (above) and the substantial revisions required to the base HEC-RAS flood models for the purposes of the breach analyses, permutations of the frequency flood events were also warranted for all alternatives (FWOFI, Decommissioning, and Structural Rehabilitation). The revisions made to the terrain, geometry, boundary conditions, computational mesh and crossings, were applied to the updated frequency flood routing scenarios. However, the frequency flood events were simulated using the diffusion wave equation set rather than the Saint Venant Equations and a coarser time step was utilized to reduce computation times. A HEC-RAS run summary spreadsheet is provided in Appendix E which presents more information about the various flood conditions that were analyzed. Spreadsheets to estimate a range of breach dimensions and formation times are included in Appendix E as well. The revised HEC-HMS and HEC-RAS models are also included in Appendix E.

SITES Hydraulic Models and Spillway Width Considerations

The SITES Freeboard Hydrograph (FBH) models were then updated based on Alternative 3 and the 250 foot wide auxiliary spillway, with the consideration of the reduced dam crest elevation (cannot raise embankment to elevation 915.0 feet in a straightforward manner due to house on right abutment). The inability to raise the embankment due to the recently-constructed home on the right abutment creates an issue with Alternative 3 clearly passing all FBH events with adequate freeboard. Additionally, only the spillway bottom width parameter in the SITES model was altered. The spillway profiles were maintained as per the alignment and grading presented in the February 2022 H&H report. The wider spillway will also result in a lower depth of flow in the auxiliary spillway channel which should be favorable for the integrity analyses. Based on the results of the previous spillway integrity analyses and consideration of the wider spillway, these revisions are not anticipated to adversely affect the spillway integrity and erodibility.

The NRCS hydrographs and SITES flood routings resulted in slightly greater peak reservoir levels during the FBH as compared with the HEC-HMS, Texas design storm events. This is largely attributed to the higher starting water surface elevation required based on NRCS procedures resulting from the 10-day drawdown and Principal Spillway Hydrograph (PSH). It is the opinion of the planning team that the auxiliary spillway can be further widened during the design phase to provide sufficient hydraulic capacity to safely pass all FBH events with adequate freeboard. It may also be possible to reasonably raise the low-point of the embankment crest to elevation 914.5 feet or potentially higher to acquire necessary freeboard. However, in the absence of a topographic site survey of the new home and associated property grading, geologic and geotechnical subsurface data within the full limits of the proposed auxiliary spillway, in-depth discussion with the property owner(s) and input from the NRCS National Design, Construction, and Soil Mechanics Center (NDCSMC), and when considering the level of detail commensurate with a planning study, any further refinement of the alternative would carry with it a significant degree of uncertainty and is best handled during the detailed design phase. This alternative can be refined during the design phase to comply with both TCEQ requirements for high hazard dams and NRCS requirements alike without resulting in significant adverse consequences beyond the limits shown by a combination of raising the embankment and/or widening the spillway further. We note that the widened spillway footprint is still within the area that was investigated during the development of this plan.

The SITES models shall be revised accordingly during the final design phase and after acquiring the necessary sub-surface geotechnical data and in coordination with NRCS, the Sponsors and property owners. However, any further attempts to refine the SITES models at this time would require many assumptions that cannot be resolved considering the data that are currently available to Schnabel. The revised SITES models are included in Appendix E.

A summary of the revised hydrologic and hydraulic storm routing analyses (HEC-HMS and SITES results) are provided in Appendix E. The hydraulic model files are also included in Appendix E. Further refinement is recommended during the final design phase.

Geology and Geotechnical Engineering

Schnabel conducted a review of available documents and reports associated with the original design and geotechnical investigation of the project. Schnabel conducted a review of the 1983 as-built (record drawings), the 1983 geology report, and the 1983 soil mechanics report to define the embankment geometry and gain insight into the subsurface conditions and material properties. Geotechnical engineering properties were estimated from the available data and empirical relationships as appropriate, and compiled for use in Schnabel's analyses. No subsurface exploration was performed during this planning study. However, a subsurface exploration program is recommended during the design phase in order to support the assumptions made during the planning phase.

The major conclusions resulting from Schnabel's geotechnical and geologic review and analyses include the following:

1. FRS 26 lacks an internal filter and drain.
2. Additional subsurface data are recommended to analyze potential failure modes during design and to better estimate in-situ material strengths.
3. Additional geologic subsurface data and laboratory testing are recommended to support the detailed SITES spillway integrity and stability analyses and the embankment slope stability analyses.
4. The upstream slope may potentially be unstable during a rapid drawdown scenario. Additional collection and testing of subsurface data in coordination with the NRCS geotechnical engineer and geologist is recommended to support the slope stability analyses during rapid drawdown.

A detailed geologic and geotechnical engineering report (Schnabel 2021) documenting the results of Schnabel's review and analyses conducted during the planning phase is provided in Appendix E.

Sedimentation

A bathymetric survey was conducted on August 21, 2020 by Schnabel's sub-consultant JQ Infrastructure. Elevation and location data were compiled and edited in AutoCAD software. A three-dimensional triangular network (TIN) model of the reservoir bottom was created to estimate the storage volume.

Big Sandy Creek FRS No. 26 Sediment Storage Capacity

Description	Sediment Storage Capacity (1984)	Sediment Storage Capacity (2020)
Submerged Sediment Capacity (Below Permanent Pool El 904.7 feet)	90.0[1]	97.2[2]
Aerated Sediment capacity (Above 904.7 Normal Pool)	162.0[3]	166.8[3]
Auxiliary Spillway Crest (Storage Capacity)	252.0[1]	264.0[2]

1. Taken from sheet 2 of 16 of the 1984 Record Drawings.
2. Calculated from 2020 bathymetric survey.
3. Aerated sediment storage volume = Storage volume at auxiliary spillway crest – submerged sediment volume.

The results of the sedimentation analysis indicate that the reservoir has sufficient sediment storage for the evaluated period next (103 years). A Sedimentation Report by Schnabel (2021) describing sediment yield and sediment storage capacity is provided in Appendix E.

Alternatives Development

Alternatives were developed in general accordance with Policies, Requirements and Guidelines (PR&G) and the National Environmental Protection Act (NEPA) requirements. After the project purpose and need for action were established, the planning team identified alternatives to address the need for action. Alternatives that were considered unfeasible were not carried forward to detailed analysis. The alternatives that were carried forward to detailed analysis were compared based on their projected environmental consequences for each relevant scoping concern. The environmental consequence comparison considers the Future Without Federal Investment (FWOFI) or NEPA no-action alternative as the baseline for these comparisons.

The following table provides additional detail and rationale regarding each of the alternatives considered and why or why not they were carried forward to detailed analysis.

Alternative	Short Name	Carried Forward?	Reason
1	FWOFI / No-Action	Yes	This is a required alternative, and forms the baseline for comparison of the other alternatives. Would not satisfy the Sponsors' need for action.
2	Decommissioning	Yes	This is a required alternative. Would satisfy the Sponsors' need for action by removing the hydraulically inadequate dam.
3	Structural Rehabilitation, Federally Assisted (Texas and NRCS standards)	Yes	Would satisfy the Sponsors' need for action and address non-compliant dam safety concerns.
4	Sponsors Alternative Non-Federally assisted (Same as Alternative 3)	No	For the purposes of this Plan, the Sponsors' alternative involves identical measures as Alternative 3. Even if the federal funds were not available, the Sponsors are under an existing maintenance agreement with NRCS and so any modifications would still need to comply with NRCS requirements. Since the effects are essentially identical, refer to the rationale for Alternative 3 except for the regional economic impacts.
5	Reduce Hazard Classification by Lowering	No	If the crest elevation of the embankment could be lowered such that reasonable justification could be provided for a reduced hazard classification, then FRS 26 would comply with TCEQ requirements and

			eliminate the Sponsors' need for action since it can already pass the significant hazard design flood event (50 percent PMF). However, breach inundation analyses related for the 50 percent PMF with breach still result in consequences that support the high hazard classification. Therefore, this alternative was not carried forward to detailed analysis.
6	Floodproofing Downstream Structures	No	If the downstream hazards could be floodproofed such that the probable loss of life condition was removed, this could potentially meet the Sponsors' need for action by justifying a reduced hazard classification. However, based on the consequences of the dam breach inundation analyses during the design flood event, the effort associated with this measure is impractical, and by inspection, would result in substantially more impacts to dozens of properties, and due to the dynamic nature of a breach flood wave, carries with it a large degree of uncertainty as to the effectiveness. Additionally, new structures or changes to the floodplain could cause FRS 26 to revert back to high hazard at a future time, and the Sponsors would have the same need for action and a non-compliant dam. For these reasons, Alternative 5 was not carried forward to detailed analysis.

Variations of the Structural Alternative

The structural alternative (Alternative 3) measures described were revised in May 2023 based on the presence of a new residential structure on the right abutment. The structure was erected after the Preliminary Draft Plan-EA was prepared, but its presence caused the previously described alternatives to become impractical or potentially problematic or unfeasible. It is still possible that raising the embankment slightly above elevation 914.0 feet is feasible, but in the absence of new, ground-run topographic data near where the house was constructed and site was graded, the planning team cannot accurately depict measures or limits of construction in this vicinity. The structural rehabilitation alternative will need to be refined during the detailed design phase following discussions with the property owners to ensure no other homes are constructed in the project area that could disrupt the planning effort or design of rehabilitation measures for FRS 26. Additional coordination with the NRCS design engineer and geologist will also be required to discuss the nuance and

limitations associated with the proposed auxiliary spillway.

Consideration of a narrower labyrinth-crested weir and chute spillway was given as an alternative. However, given the particular site conditions of FRS 26, a reinforced-concrete labyrinth and chute would result in exorbitant installation costs and is not required to achieve compliance with the dam safety deficiencies and meet the project's need. Additionally, a reinforced-concrete chute would change the land use and increase the amount of impervious surface within the project area. The long auxiliary spillway channel would require a similarly long chute and cause prices to increase even further for no perceived or actual benefit. The required energy dissipation structure at the terminus of a reinforced-concrete chute spillway would cause irreversible impacts to stream channel and wetlands near the outlet of the chute. Since widening of the auxiliary spillway can accomplish the Sponsors' need for action and involves only site grading and minor earthwork, this will be a far less impactful and far less expensive alternative and will result in no appreciable changes to the land use. Therefore, the structural rehabilitation considers and refers specifically to a vegetated auxiliary spillway.

Lastly, two energy dissipation structure alternatives were considered for the principal spillway. One involves the construction of a reinforced-concrete impact basin, and the other by installing a riprap lined plunge-pool. These measures are extremely similar within the overall scope of the project. However, additional discussions with the NRCS design engineer, project sponsors and property owners are recommended during the design phase to determine the most appropriate structure to be used. Schematics presenting the two energy dissipation structure options are provided in Appendix C.

Economic Analysis

Purpose

The purpose of the economic analyses was to quantify the annual average flood protection benefits provided by FRS 26 for each alternative. The benefits were computed by calculating the difference of the average annualized flood damages for each action alternative as compared with the no-action alternative. The annualized benefits were then compared with the annualized costs (annualized installation + annual operation & maintenance) to develop the benefit to cost ratio for each alternative.

LifeSim Analyses

Schnabel utilized the USACE Risk Management Center's LifeSim software, v2.0.5, to estimate the consequences and economic damages associated with the various flood conditions that were analyzed as part of this plan. The LifeSim program is capable of estimating economic damages based on imported HEC-RAS result files. The user can import structure databases such as readily available National Structure Inventory (NSI) data sets.

The Wise County tax records were reviewed and supported the estimations of structure, content

and vehicle damages for structures that were not included in the publicly available NSI database. Road damages are not estimated using the LifeSim software. The estimation of roadway damages is described below under a separate heading.

The hydraulic data imported from various HEC-RAS plans was used to generate summary hydraulics in LifeSim. The summary hydraulics provide information based on the assigned hydraulic event and structure database. The summary hydraulics are point shapefiles that contain attributes such as depth of flooding, velocity, destruction factor (the product of depth and velocity) at each of the structures that are impacted by the hydraulic event.

Simulations can be developed to estimate various metrics including, but not limited to:

- Population at risk
- Estimated Life Loss
- Economic Damages

The population at risk and estimated life loss parameters are valuable tools for emergency planning and refining hazard classifications and emergency action plans. However, those metrics are outside of the scope of the Plan-EA.

The economic damages are also estimated based on the aforementioned data within the LifeSim model. The results tables provide the sum of all economic damages based on the hydraulic event(s) in the simulation and the structure database(s) being analyzed for a given simulation.

The assumed parameters for evacuation and notification were included in the LifeSim model. Life loss estimates and Population at Risk (PAR) were estimated, but a thorough evaluation of these parameters was not performed as part of this analysis. The LifeSim models used to estimate economic damages and flood damage consequences for FRS 26 are provided in Appendix E. Spreadsheet tabulations of the LifeSim results for structural, content and vehicle damages for each structure and in the database and each hydrologic event analyzed are provided in Appendix E.

Roadway Damages

Roadway damages were estimated using the following metric:

Estimated repair costs per linear foot of roadway flooded. A value of $150/linear foot of road inundation was used as the basis for estimation. The BNSF railroad is also a consequence of some of the analyzed hydraulic flooding events. $150/linear foot was applied to economic damage estimates of the BNSF railroad as well. The estimated damages per linear foot of roadway value was provided by Headwaters Corporation as $158/linear foot, rounded to the nearest $50.

Schnabel utilized the revised flood routing analyses as the basis for estimating the lengths of each roadway that were inundated during each flood event. The lengths of flooding were

estimated from the HEC-RAS 6.4 measurement tool contained within the program's RAS mapper interface. The lengths of flooding for each roadway were tabulated for each flood event. Flood damages were estimated by summing the product of the flooded length and the estimated repair cost per linear foot of roadway for each flood event. No vehicle damages were included in the roadway damage economic analyses. Spreadsheet tabulations of the estimated flood damage results for each roadway and each hydrologic event analyzed are presented in Appendix E.

Average Annual Damages

The total damages (structures, contents, vehicles, and roadways) were summed for each analyzed hydrologic event. The exceedance probability for each hydrologic event was assigned based on the inverse of the return interval (e.g. the two-year storm annual exceedance probability is 1 divided by 2 or 0.5 or 50%, the 100-year storm annual exceedance probability is 1 divided by 100 or 0.01 or 1%). A column representing the products of the difference in probability between each consecutive storm event and the average flood damages for those two hydrologic events was computed. The sum of those products for a given alternative represents the annual average flood damages.

We note that per recent national guidance (Title 390, Part 303, December 2022), the probability of the PMP during failure is to be estimated and included as part of the economic analyses. Schnabel estimated the probability of the 2-hour, Local Texas PMP by developing a regression equation based on the 1- through 1000-year, 2-hour rainfall amounts (per NOAA Atlas 14) and extrapolating towards the PMP. A power function was used to estimate the regression equation. The extrapolated probability of the event based on the subject PMP event's rainfall depth was estimated to be on the order of 1 in 568,544. The power function regression has a mean R squared value of approximately 0.989. A spreadsheet presenting the power function regression equation and extrapolation of the PMP probability is provided in Appendix E.

A spreadsheet containing the total damages for each hydrologic event and each alternative, and the average annualized flood damages for each alternative is provided in Appendix E.

Engineer's Opinion of Probable Construction Cost

Schnabel developed opinions of construction cost estimates for Alternative 2 – Decommissioning and Alternative 3 – Structural Rehabilitation. Estimated construction quantities were prepared based on the likely proposed measures associated with the two alternatives. A contingency of 25% was applied to the engineer's opinion of construction costs. The engineer's opinion of construction costs are based on estimated unit rates and quantities based on the time the estimates were prepared. Actual construction costs may differ following completion of the final design and will be based on bids received on the final construction documents by qualified contractors. Spreadsheet tabulations of the unit rates and quantities are provided in Appendix E.

Operation and Maintenance Costs

The annualized operation and maintenance costs were estimated based on routine maintenance and anticipated periodic repairs and activities at the dam, annualized based on their frequency of occurrence. Spreadsheet tabulations of the estimated operation and maintenance costs are provided in Appendix E.

Installation Cost for Preferred Alternative

The total installation cost for the preferred alternative involves the summation of all project costs required to implement the proposed alternative. The project installation costs include:

- Final engineering design costs and field inspections, including;
  - geologic investigations
  - environmental field evaluations (as required)
  - archaeological survey (as required)
- Project administration costs
- Permitting costs
- Real Property Rights
- Construction Cost

The sum of the installation costs were amortized for the period of analysis. A period of analysis of 100 years was used. The USDA discount rate for water resource projects planned during the 2023 fiscal year is 2.50%. The amortized installation cost and the estimated annual operation and maintenance costs form the annual project costs and were used as the denominator of the benefit to cost ratio.

The project costs are summarized in the cost tables in the Plan-EA. Additionally, a spreadsheet tabulation of the estimated project installation cost for Alternative 3 is provided in Appendix E.

Environmental Considerations

Purpose

The Affected Environment was analyzed by the planning team. EAEST reviewed several of the initially determined scoping concerns and performed a desktop study of various soil, plant, animal and other environmental scoping concerns potentially residing within the study area. EAEST also performed a field delineation of Waters of the United States (WOTUS) within the project area. The Affected Environment report and Wetland Delineation Report are provided in Appendix E.

Findings and Documentation

The Affected Environment report was prepared in 2021 by EAEST based on the alternatives formulated at that time. Alternatives 1 and 2 described in the Affected Environment report

both refer to variations of the structural rehabilitation alternative (now Alternative 3). The Decommissioning is also described in the Affected Environment report. The projected environmental consequences were established by EAEST based on the project conditions at that time.

Following receipt of the NWMC comments, the alternatives were re-evaluated to comply with policy and address the comments on the preliminary draft plan. The limits of study presented in the Affected Environment report encompass the project area and any revised project areas. Minor revisions to the limits of disturbance were required based on the new house constructed on the right abutment (see section in this report "New Residential Structure on Right Abutment." Minor revisions to the scoping table items and rationales were made to the Plan-EA based on NWMC comments, as well as to improve the overall rationales as they pertain to the project's stated purpose and need.

The 2021 Affected Environment Report prepared by EAEST is presented in Appendix E, which provides additional information regarding the environmental assessment and the results of the desktop analysis based on the 2021 project conditions. The revision to the Alternatives did not substantially affect the impacted resources.

Following comments received from NWMC and in coordination with NRCS and the project team, EAEST performed a field delineation of wetlands at the project site on October 11, 2023. EAEST's wetlands scientists identified nine (9) wetlands, totaling 14.61 acres. EAEST's wetlands scientists also identified three (3) waterways within the investigation area, totaling 3,065 linear feet / 0.152 acres. The methodologies, findings, and details of the wetland field delineation are presented in a report titled "Wetland Delineation Report" by EAEST (December 2023).

Cultural Resources

Purpose

AmaTerra performed a literature and desktop review regarding the cultural resources associated with FRS 26. In February 2024, AmaTerra performed an archaeological field survey in response to comments from NWMC. An account of the findings is presented in AmaTerra's Cultural Resources constraints memorandum and in the Archaeological Field Report (Appendix E).

Findings and Documentation

Section 106 consultation was initiated with the Texas Historical Commission (THC) to present the conceptual alternatives and preliminary findings. The THC recommended an archaeological survey be performed prior to beginning construction activities. No historic structures were identified within the project area. NRCS is responsible for tribal government coordination.

In February 2024, in response to NWMC comments, AmaTerra performed an archaeological field survey of the project area to identify if any artifacts or historic properties were present. Shovel tests were performed, as well as visual observation of the surrounding areas. The archaeological field survey was a necessary prerequisite to NRCS completing the S106 Consultation process. The methodologies, findings and other pertinent information regarding the archaeological field survey are documented in a report dated March 19, 2024. No findings of historical significance were uncovered during the archaeological field reconnaissance. Following completion of the field survey, the archaeological report was submitted to NRCS, USFS and THC to review the findings and complete S106 process. The report also allowed NRCS to complete their Tribal consultation. The full report is

A public meeting will be conducted to present the findings of the Draft Plan-EA and present the preferred alternative to the community and project stakeholders. NRCS will invite the tribes to participate in the public meeting, and to invite the tribes to review the draft Plan-EA during public and interagency review. No historically significant sites have been identified within the project area during the planning investigation. The results of a future archaeological survey will confirm that there are no artifacts located within the project footprint.

APPENDIX E

OTHER SUPPORTING INFORMATION
(Provided In Digital Format Only)

Big Sandy FRS 26 - Plan-EA - Appendix E Index - 2024-05-28

Date	Folder Description
1979-1984	Big Sandy Creek Watershed Work Plans, EIS
1981	Aerial Photograph
1983	SCS Geotech and Design
1984	NRCS As-Builts
2011	Freese and Nichols Dam Assessment Report
2019	Wise County Developmental Regulations
2020-2021	Schnabel Engineering Site Photographs and Downstream Crossings
2020	Datum Conversion
2020	Demographics
2020	LiDAR Topography
2020	Parcels from Wise County
2020	Public Participation Plan
2021	EAEST Affected Environment Report
2021	JQ Infrastructure Bathymetric Survey
2021	Schnabel Engineering Geotechnical Report
2021	Schnabel Engineering Sedimentation Report
2021	Schnabel Engineering Structural Report
2021	Schnabel Engineering Visual Inspection
2022	Schnabel Engineering Cultural Resources
2022	FEMA Data
2022	Schnabel Engineering Hydrology and Hydraulics
2023	Headwaters Corporation and Schnabel Engineering Economic Analysis
2023	Schnabel Engineering Revised Hydrology and Hydraulics
2023	BIS Consultants Updated Parcel Data
2023	USFW Consultation
2023	EAEST Wetlands Delineation
2024	ERG Archaeological Survey Report