



**DEPARTMENT OF THE ARMY**  
US ARMY ENGINEER DIVISION, SOUTHWESTERN  
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DALLAS TX 75242-1317

REPLY TO  
ATTENTION OF

CESWD-PDS-P (1105)

05 JAN 2010

MEMORANDUM FOR Commander, Fort Worth District

SUBJECT: Review Plan for Big Fossil Creek Watershed Interim Feasibility Study, Texas

1. References:


- a. EC 1105-2-410, 22 August 2008, Review of Decision Documents.
- b. Memorandum, CECW-CP, 30 March 2007, subject: Peer Review Process.
- c. Addendum to Reference 1.b., CECW-CP, September 2008, subject: Supplemental Information for the Peer Review Process.

2. The review plan for the subject study, enclosed, has been reviewed and cleared for approval by the Flood Risk Management Planning Center of Expertise. It has been prepared in accordance with the referenced guidance, and public comments received will be incorporated into the plan as the study progresses. It is not anticipated to require Independent External Peer Review.

3. I hereby approve this review plan, which is subject to change as study circumstances require, consistent with study development under the Project Management Business Process. Subsequent substantial revisions to this plan or its execution will require new written approval from this office.

4. If you have questions or need further information, please contact Jo Ann M. Duman, CESWD-PDS-P, at (469) 487-7065.

Encl

  
ANTHONY C. FUNKHOUSER  
Colonel, EN  
Commanding

CF:  
CESWG-PER-PP (Newman)

# **REVIEW PLAN**

**Big Fossil Creek Watershed Interim Feasibility Study  
Upper Trinity Basin Feasibility Study  
Tarrant County, Texas**

**Fort Worth District**

**October 2009**

**REVIEW PLAN**

**Big Fossil Creek Watershed Interim Feasibility Study  
Upper Trinity Basin Feasibility Study**

**TABLE OF CONTENTS**

1. PURPOSE AND REQUIREMENTS..... 1

2. STUDY INFORMATION..... 2

3. AGENCY TECHNICAL REVIEW (ATR) ..... 5

4. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)..... 7

5. MODEL CERTIFICATION AND APPROVAL ..... 8

6. REVIEW SCHEDULES AND COSTS ..... 10

7. PUBLIC PARTICIPATION..... 11

8. PCX COORDINATION..... 11

9. MSC APPROVAL..... 11

10. REVIEW PLAN POINTS OF CONTACT ..... 12

ATTACHMENT 1: TEAM ROSTERS ..... 13

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE ..... 14

ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS..... 16

## 1. PURPOSE AND REQUIREMENTS

**Purpose.** This Review Plan defines the scope and level of peer review for the Big Fossil Creek Watershed Interim Feasibility Study, Upper Trinity Basin Feasibility Study (study).

### a. References

- (1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 6 Jan 2009
- (2) EC 1105-2-410, Review of Decision Documents, 22 Aug 2008
- (3) EC 1105-2-407, Planning Models Improvement Program: Model Certification, 31 May 2005
- (4) Engineering Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006

**b. Requirements.** This Review Plan was developed in accordance with EC 1105-2-410, which establishes the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision documents through independent review. The EC outlines three levels of review: District Quality Control, Agency Technical Review, and Independent External Peer Review. In addition to these three levels of review, decision documents are subject to policy and legal compliance review and, if applicable, safety assurance review and model certification/approval.

- (1) District Quality Control (DQC). DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. It is managed in the home district and may be conducted by staff in the home district as long as they are not doing the work involved in the study, including contracted work that is being reviewed. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander. The Major Subordinate Command (MSC)/District quality management plans address the conduct and documentation of this fundamental level of review; DQC is not addressed further in this Review Plan.
- (2) Agency Technical Review (ATR). ATR is an in-depth review, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists [RTS], etc.), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC.
- (3) Independent External Peer Review (IEPR). IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. IEPR is generally for feasibility and reevaluation studies and modification reports with Environmental Impact Statements (EISs). IEPR is managed by an outside eligible organization (OEO) that is described in Internal Revenue Code Section 501(c) (3), is exempt from Federal tax under section 501(a), of the Internal Revenue Code of 1986; is independent; is free from conflicts of interest; does not carry out or advocate for or against Federal water resources projects; and has experience in establishing and administering IEPR panels. The scope of review will address all the underlying planning, engineering, including safety

assurance, economics, and environmental analyses performed, not just one aspect of the project.

- (4) **Policy and Legal Compliance Review.** Decision documents will be reviewed throughout the study process for their compliance with law and policy. These reviews culminate in Washington-level determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the Chief of Engineers. Guidance for policy and legal compliance reviews is addressed further in Appendix H, ER 1105-2-100, Planning Guidance Notebook. When policy and/or legal concerns arise during DQC or ATR that are not readily and mutually resolved by the PDT and the reviewers, the District will seek issue resolution support from the MSC and Headquarters USACE (HQUSACE) in accordance with the procedures outlined in Appendix H, ER 1105-2-100. IEPR teams are not expected to be knowledgeable of Army and administration policies, nor are they expected to address such concerns. The home district Office of Counsel is responsible for the legal review of each decision document and signing a certification of legal sufficiency.
- (5) **Safety Assurance Review.** In accordance with Section 2035 of Water Resources Development Act (WRDA) of 2007, EC 1105-2-410 requires that all projects addressing flooding or storm damage reduction undergo a safety assurance review of the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring public health, safety, and welfare. A future circular will provide a more comprehensive Civil Works Review Policy that will address the review process for the entire life cycle of a Civil Works project. That document will address the requirements for a safety assurance review for the Pre-Construction Engineering Phase, the Construction Phase, and the Operations Phase. The decision document phase is the initial design phase; therefore, ER 1105-2-410 requires that safety assurance factors be considered in all reviews for decision document phase studies.
- (6) **Model Certification/Approval.** EC 1105-2-407 requires certification (for USACE models) or approval (for non-USACE models) of planning models used for all planning activities. The EC defines planning models as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision-making. The EC does not cover engineering models used in planning. Engineering software is being address under the Engineering and Construction Science and Engineering Technology (SET) initiative. Until an appropriate process that documents the quality of commonly used engineering software is developed through the SET initiative, engineering activities in support of planning studies shall proceed as in the past. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed.

## 2. STUDY INFORMATION

- a. **Decision Document.** A report for the Big Fossil Creek Watershed Interim Feasibility Study is to be prepared as authorized under the United States Senate Committee on Environment and Public Works Resolution dated April 22, 1988, which reads as follows:

Resolved by the Committee on Environment and Public Works of the United States Senate, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Trinity River and Tributaries, Texas, House Document No. 276, Eighty-Ninth Congress, and other pertinent reports, with a view to determining the advisability of modifying the recommendations contained therein, with particular reference to providing improvements in the interest of flood protection, environmental enhancement, water quality, recreation, and other allied purposes in the Upper Trinity River Basin with specific attention on the Dallas-Fort Worth Metroplex.

The above cited legislation defined the area of investigations as the Upper Trinity River Basin with specific emphasis on the Dallas – Fort Worth Metroplex. Big Fossil Creek is a sub-basin of the Upper Trinity River watershed and is therefore authorized under this legislation. The study fits into the overall concept of the Upper Trinity Vision to conduct an integrated and coordinated approach to locating and implementing opportunities for flood risk reduction, ecosystem restoration, recreation, and other allied purposes along the Trinity River system. If a Feasibility Report is approved by the Chief of Engineers, implementation of a recommended plan will require Congressional authorization.

- b. Study Description.** The purpose of the study is to develop a Watershed Management Plan (WMP) that will recommend measures that local sponsors will implement on their own and it will also recommend USACE projects for construction that will be carried forward for approval in a Feasibility Report. The feasibility report component of the Big Fossil Creek Watershed Interim Feasibility Study will ultimately present a recommendation whether to authorize construction of a flood risk management, ecosystem restoration, and recreation project in the Big Fossil Creek Watershed.

The Big Fossil Creek is a major tributary of the West Fork of the Trinity River. The creek's watershed is located entirely within northern Tarrant County, Texas. This study area is about 16 miles long and has an average width of about 3.5 miles. The headwaters and the mouth of this watershed are located about 14 miles north-northwest and six miles east-northeast of downtown Fort Worth, respectively. Elevations within the entire 74-square mile watershed range from 885 to 464 feet. This particular study was focused on the 57.74 square mile (36,954.84 acres) portion of the Big Fossil Creek watershed situated upstream from the mouth of Little Fossil Creek. The cities of Fort Worth, Richland Hills, North Richland Hills, Keller, Haltom City, Haslet, Saginaw, and Watauga are within the study area.

The study will produce two documents. The feasibility study component of the Big Fossil Creek Watershed Interim Feasibility Study will follow the USACE feasibility study process and will investigate structural measures such as upstream detention, and nonstructural measures such as evacuation of the floodplain. Ecosystem restoration measures will include purchase of floodplain land and revegetation of riparian zones, rebuilding stream banks, restoring wetlands and other measures that could be applicable. Multipurpose measures will also be explored to fully utilize project lands if features are compatible. The WMP component of the study will identify watershed management strategies and develop management measures that local sponsors would implement on their own including urban growth measures such as zoning and building restrictions within the floodplain and adopt development regulations such as a floodplain development permitting system and comprehensive drainage policies. These opportunities are for local partners; however, the USACE would have a coordination and collaboration role.

The Upper Trinity River Basin Study is an umbrella study under which there are several "interim" feasibility studies being conducted. The Upper Trinity River Basin Final Programmatic Environmental Impact Statement (PEIS) was prepared in June 2000, which addressed cumulative impacts resulting from implementation of the entire suite of projects proposed in the Upper Trinity

River Basin. Pursuant to the National Environmental Policy Act (NEPA), an Environmental Assessment (EA) or Environmental Impact Statement will be integrated in the Feasibility Report. A Finding of No Significant Impact (FONSI) is expected.

There will be DQC and ATR for the Feasibility Report. The timing and scope of these reviews is discussed in the following sections of this Review Plan. DQC and ATR of submittal packages and feasibility report materials will be required prior to the following major milestones:

- Feasibility Scoping Meeting (FSM)
- Alternative Formulation Briefing (AFB)
- Draft Feasibility Report
- Final Feasibility Report

The total Big Fossil Creek Watershed Interim Feasibility Study cost is estimated at \$1.85 million and is cost shared at 50% Federal and 50% non-Federal cost. There is \$445,000 worth of estimated work-in-kind services. A total of \$210,000 is estimated for Project Management and \$235,000 is estimated for surveys, environmental studies, recreation studies, GIS and real estate requirements. The total project cost is unknown at this time, but it is expected not to exceed \$45 million.

The study is being sponsored by the North Central Texas Council of Governments (NCTCOG), which represents the municipalities of Haltom City, Saginaw, Watauga, Fort Worth, Richland Hills, North Richland Hills, Keller, and Haslet. Tarrant County and the Texas Water Development Board (TWDB) are also participating in the study. The communities whose city limits and/or boundaries fall within the Big Fossil Creek watershed decided to jointly participate in this study to explore strategic methods of managing the watershed with a systems perspective.

The study area lies within the jurisdiction of the Texas U. S. Congressional District 12 (Rep. Kay Granger) and District 26 (Rep. Michael C. Burgess). Current state senators are Sen. John Cornyn and Sen. Kay Hutchison.

- c. **Factors Affecting the Scope and Level of Review.** The study has not reached the feasibility scoping meeting milestone, and as such, much of the project risk is unknown at this time. During the feasibility study, project risk will be analyzed in detail and disclosed in the Draft and Final Interim Feasibility Reports. However, generalized project risk of alternatives considered at this time can be discussed. The alternative with the least amount of project risk for future damages would be evacuation of the floodplain. This is because if a structure is removed, it can no longer be damaged. With a structural detention alternative, there is an inherent project risk. The structural project in the form of a detention would provide a reduction in flood damages from floods of all magnitudes. In addition, there is a risk of project failure from geotechnical issues, lack of operations and maintenance, etc. This risk cannot be determined until detailed analyses have occurred to determine the associated risk.

This study does not contain influential scientific information or assessment, nor does it expected to have significant economic, environmental or social affects to the nation. Interagency interest is limited to the coordination required by federal law. Loss of one life in the Big Fossil Creek watershed was recorded in a flood event. The rain event of June 18, 2007 resulted in the drowning of a four-year-old in Whites Branch, Haltom City. No other significant safety issues have been presented in relation to this study or are expected in relation to any recommended project. Close coordination with the sponsor and public meetings are expected to negate significant public dispute with regard to a recommended plan as are coordination with U.S. Fish and Wildlife Service (USFWS) and Environmental Protection Agency (EPA) and cultural/archeological interests. Methods and

models used in this study are typical of all USACE multi-purpose studies with little room for interpretation and are not expected to change prevailing practices on this or future multi-purpose studies. Currently, the Feasibility Report is not expected to require an IEPR. If necessary, IEPR will occur after a final report is prepared, but before the Civil Works Review Board (CWRB) and State and Agency Review of the Final Feasibility Report.

- d. **In-Kind Contributions.** There is \$445,000 worth of estimated work-in-kind services. A total of \$210,000 is estimated for Project Management and \$235,000 is estimated for surveys, environmental studies, recreation studies, GIS and real estate requirements. These products will be reviewed by the PDT and the district's experts as required by the Southwestern Division (SWD) Quality Assurance Plan and Corps policy and guidance.

### 3. AGENCY TECHNICAL REVIEW (ATR)

- a. **General.** ATR for decision documents covered by EC 1105-2-410 are managed by the appropriate Planning Center of Expertise (PCX) with appropriate consultation with the allied Communities of Practice such as engineering and real estate. The ATR shall ensure that the product is consistent with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and the results in a reasonably clear manner for the public and decision makers. Members of the ATR team will be from outside the home district. The ATR lead will be from outside the home MSC. The leader of the ATR team will participate in milestone conferences and the CWRB to address review concerns.
- b. **Products for Review.** ATR will occur prior to major decision points in the planning process so that the technical results can be relied upon in setting the course for further study. An in-depth review of the report and all appendices will be coordinated and documented by the PDT leader prior to HQUSACE policy compliance review. As mentioned throughout the PMP, all ATR will be coordinated with the PCX for Flood Risk Management (FRM PCX) for this report. The ATR will be accomplished by an independent entity outside the Fort Worth District, within USACE, as designated by the PCX. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices of all project decision documents. The intent is for an ATR to not only ensure technical analyses are correct, but also ensure compliance with all pertinent USACE guidance in or to high quality products early in the study prior to HQUSACE review. ATR will be completed on the following documentation:

- FSM Documentation
- AFB Documentation
- Draft Feasibility Report
- Final Feasibility Report

Additional Issue Resolution Conferences (IRCs) may be required throughout the study when significant policy issues arise. If these require documentation for major decision making, then additional ATR of this documentation may be required; however, no IRCs are expected at this time. This quality control will occur prior to the decision event so that a firm technical basis for making decisions will be established. As a result, the decision event is free to address critical outstanding issues and set the direction for the next step of the study.

- c. **Required ATR Team Expertise.** The expertise and disciplines represented on the ATR team reflect the significant disciplines involved in the planning effort. The team roster is included in this Review



Plan under Attachment 1. The ATR team consists of at least 10 team members in the following functional areas:

**Plan Formulation:** Team member should have extensive experience in the Corps planning process and be knowledgeable of Corps policies and guidelines. He or she should be familiar with flood risk management projects, water resources and watershed planning and have experience relevant to issues associated with perched banks and flat topography.

**Hydrology and Hydraulics:** Team member should be an expert in the field of urban hydrology and hydraulics, have a thorough understanding of open channel systems, the effects of management practices and low impact development on hydrology, the use of levees and floodwalls within the space constraints of an urban environment, the use of non-structural systems as they apply to flood proofing, warning systems, and evacuation, and the use of Hydrologic Engineering Center (HEC) computer modeling systems.

**Civil Design:** Team member will have experience with utility relocations, positive closure requirements, interior drainage requirements, and application of non-structural flood damage reduction measures. A certified professional engineer is suggested.

**Structural Design:** Team member will have a thorough understanding of both structural and non-structural measures to include, but not be limited to, retaining walls, gate structures, bridges and culverts, utility penetrations, and stoplog and sandbag gaps. A certified professional engineer is suggested.

**Geotechnical:** Team member will have extensive experience in levee and floodwall design, pre- and post-construction evaluation, and rehabilitation. A certified professional engineer is strongly recommended.

**Cost Estimating:** Team member will be familiar with cost estimating for similar projects in Micro Computer Aided Cost Estimating System (MCACES). Review includes construction schedules and contingencies for any document requiring Congressional authorization. The team member will be a Certified Cost Technician, a Certified Cost Consultant, or a Certified Cost Engineer. The Cost Engineering Directory of Expertise (DX), Walla Walla District will assign this team member as part of a separate effort coordinated by the ATR or IEPR team lead in conjunction with the home district's project manager.

**Economics:** Team member will have extensive experience in flood damage reduction projects and a thorough understanding of HEC-FDA.

**Cultural, Environmental, Real Estate, Hazardous, Toxic and Radioactive Waste (HTRW), and Recreation:** Team members will be familiar with similar studies and projects.

Legal review is the responsibility of the Corps of Engineers, Office of Counsel and is not under the purview of the ATR team.

- d. Documentation of ATR.** DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:

- (1) The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;
- (2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
- (3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in or to then assess whether further specific concerns may exist. The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of each unresolved issue; each unresolved issue will be raised to the vertical team for resolution. Review Reports will be considered an integral part of the ATR documentation and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. Certification of ATR should be completed, based on work reviewed to date, for the AFB, draft report, and final report. A sample certification is included in ER 1110-2-12 (Attachment 2).

#### **4. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)**

- a. General.** IEPR is conducted for decision documents if there is a vertical team decision (involving the district, MSC, PCX, and HQUSACE members) that the covered subject matter meets certain criteria (described in EC 1105-2-410) where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside the USACE is warranted. IEPR is coordinated by the appropriate PCX and managed by an OEO external to the USACE. IEPR panels shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable. To provide effective review, in terms of both usefulness of results and credibility, the review panels should be given the flexibility to bring important issues to the attention of decision makers; however, review panels should be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. IEPR panels will accomplish a concurrent review that covers the entire decision document and will address all the underlying engineering, economics, and environmental work, not just one aspect of the study. Whenever feasible and appropriate, the office producing the document shall make the draft decision document available to the public for comment at the same time it is submitted for review (or during the review process) and sponsor a public meeting where oral presentations on scientific issues can be made to the reviewers by interested members of the public. An IEPR panel or OEO representative will participate in the CWRB.

- b. Decision on IEPR.** It is not expected that IEPR will be required for this study. This study does not contain influential scientific information or assessment, nor does it have significant economic, environmental or social affects to the nation. Interagency interest is limited to the coordination required by federal law. No other significant safety issues have been presented in relation to this study or are expected in relation to any recommended project. There is not a recommended project for this study at this time; however any recommendation is not expected to exceed \$45 million. Close coordination with the sponsor and public meetings are expected to negate significant public dispute with regard to a recommended plan as are coordination with USFWS and EPA and cultural/archeological interests. Methods and models used in this study are typical of all USACE multi-purpose projects with little room for interpretation and are not expected to change prevailing practices on this or future multi-purpose studies. If necessary, IEPR will occur after a final report is prepared, but before the CWRB and State and Agency Review of the Final Feasibility Report.
- c. Products for Review.** Not applicable.
- d. Required IEPR Panel Expertise.** Not applicable.
- e. Documentation of IEPR.** Not applicable.

## **5. MODEL CERTIFICATION AND APPROVAL**

- a. General.** The use of certified or approved models for all planning activities is required by EC 1105-2-407. This policy is applicable to all planning models currently in use, models under development and new models. The appropriate PCX will be responsible for model certification/approval. The goal of certification/approval is to establish that planning products are theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The use of a certified or approved model does not constitute technical review of the planning product. Independent review of the selection and application of the model and the input data and results is still required through conduct of DQC, ATR, and, if appropriate, IEPR. Independent review is applicable to all models, not just planning models. Both the planning models and engineering models, including the certification/approval status of each model, used in the development of the decision document are described below:
  - b. Planning Models.** The following planning models are anticipated to be used:
    - HEC-FDA 1.2.4 (*Certified*). The Hydrologic Engineering Center’s Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans along the Big Fossil Creek watershed, Tarrant County, Texas to aid in the selection of a recommended plan to manage flood risk.
    - The United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980) (*Certified*) was used to evaluate habitat conditions that would result from alternative plans including the no action alternative. A habitat suitability index (HSI) for indicator species is derived by aggregating suitability indices (SIs) critical for habitat variables. These SIs are based on field measurements for existing conditions and on professional judgment for future conditions under alternative plans. The index ranges from 0.0 to 1.0, with 1.0 representing the highest habitat quality possible. A habitat unit (HU) is the product of the HSI multiplied by an area (acre) of available habitat. HSIs and HUs would be developed for different times during the period of

analysis (at year 1, 15, 25, and 50), and HUs would be annualized to estimate an average annual habitat unit (AAHU).

In this system, future habitat conditions can be estimated for both baseline (without project) and design (with project) conditions. Projected long-term effects of the project can be predicted using Average Annual Habitat Unit (AAHU) values. Based on the AAHU outcomes, alternative designs can be formulated and trade-off analyses can be simulated to promote environmental optimization. AAHUs are determined by multiplying the HSI by the number of acres in the study area, and therefore, HEP provides information for two general types of wildlife habitat comparisons. The first is the relative value of different areas at the same point in time. The second is the relative value of the same area at future points. Therefore, the impact of land and water use changes on wildlife habitat can be estimated.

The USFWS, with the USACE Fort Worth District, completed the HEP for the without-project (existing and future) condition of riparian natural resources. Because the resource agencies are most concerned in the restoration of lost aquatic and riparian habitat functions, the focus was to use models that contain variables that measure important components of that habitat. The following species, indicative of healthy ecosystems within the Big Fossil Creek watershed, were used for the habitat evaluations.

- Riparian Woodlands: raccoon, barred owl, fox squirrel, Carolina chickadee, wood duck, and red-tailed hawk
- Herbaceous Wetlands: raccoon, green heron, and wood duck
- Grasslands, Tree Savanna and Shrub Savanna: eastern meadowlark, eastern cottontail, red-tailed hawk
- Shrubland: Eastern cottontail, raccoon, red-tailed hawk, scissor-tailed flycatcher
- Upland Deciduous Forest: red-tailed hawk, hairy woodpecker, raccoon, Carolina chickadee, barred owl, and fox squirrel

While these species are relatively common, their HSI models, when averaged cumulatively, serve as good indicators of a healthy, functioning ecosystem and therefore provide a good basis for comparing outputs from alternatives plans. However, they should not be used to judge the importance or significance of these habitats.

- Regional Index of Biological Integrity (IBI). (*Certified*). A Regional Index of Biotic Integrity (IBI) for each site on Big Fossil Creek and its tributaries was utilized to determine a habitat suitability index. The Regional IBI was divided by the theoretical maximum regional stream related IBI and presented in decimal format. This approximates the traditional concept of the development of HSI values where the theoretical maximum HSI value of 1.0 would reflect the value accredited to best habitat that could be expected within a regional area.

The Regional IBI scores will be utilized as the basis for future analysis should a project modification be recommended in the Big Fossil Creek stream habitat similar to the HEP model. For any site modification impacting the stream beneficially or adversely, acreages of stream aquatic habitat will be determined from information developed based upon hydrologic and hydraulic modeling of existing conditions and by comparison of modeled conditions to field notes taken during the study. Fluvial geomorphology studies will be utilized if necessary to develop future conditions only for those stream sites recommended for further study.

c. **Engineering Models.** The following engineering models are anticipated to be used:

- HEC-RAS 3.3. The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program version was used for steady flow analysis to evaluate the future without project conditions in the Big Fossil Creek watershed. Additional work done in the future probably will be analyzed with a later version of the software, especially if additional capabilities have been developed that will add to the analyses being done. Previous results will be verified, compared and updated as necessary.
- HEC-HMS 2.2. The Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) simulates precipitation-runoff processes. Version 2.2.2 was chosen over the newer version, 3.3. Additional work done in the future probably will be analyzed with a latter version of the software, especially if additional capabilities have been developed that will add to the analyses being done or improve the efficiency of doing the work. Previous results will be verified, compared and updated as necessary.
- HEC-geoRAS 4.0. Future additional work will be done using the latest working version available.
- Geo-HMS 1.0. This version was used to develop digital sub-basin models for the work. This version runs on an ArcView version 3.3 plat form which is no longer being used: therefore; any future digital hydrology modeling that is done for this project will be done using the latest available working version of the software.

## 6. REVIEW SCHEDULES AND COSTS

a. **ATR Schedule and Cost.** ATR will be completed prior to submission of documentation to the vertical team for a decision. ATR cost for the FSM is expected to be \$25,000. Additional ATR costs for the AFB and draft feasibility report are currently estimated to be \$35,000. These costs are cost-shared with the study's non-federal sponsors. ATR will be completed on the following documentation:

- FSM Documentation, anticipated September 2009
- AFB Documentation, anticipated August 2010
- Draft Feasibility Report, anticipated November 2011
- Final Feasibility Report, anticipated May 2012

b. **IEPR Schedule and Cost.** Not Applicable.

c. **Model Certification/Approval Schedule and Cost.**

- Engineering (HEC) models are not certifiable by the PCX.
- The Regional IBI has a package under development to initiate the certification effort. At this time schedule and cost are not known. Coordination with the Ecosystem Restoration PCX has not yet been initiated by Fort Worth District, but may have been initiated by other districts as this model has been in use by the USFWS in the past, and on multiple studies completed by multiple districts in subsequent years. It is not expected to have certification complete prior to issuing the final feasibility report for this study. Coordination with USFWS on several studies currently

underway with similar aquatic habitat conditions has led the Fort Worth District to pursue authorization for use as part of the ATR process for each independent study.

## **7. PUBLIC PARTICIPATION**

The public will be able to comment on the feasibility study during the decision making process. Several public meetings will be held throughout the study. A public workshop will be held during the development of alternatives, which will be held after the FSM and prior to the AFB. In addition, after a tentatively selected plan is determined, a public meeting will be held to solicit public comment on the plan. Finally, a public meeting is normally held during the public review process of the draft feasibility report.

The public will have an opportunity to review and provide comments on the draft feasibility report and integrated EA for 30 days occurring approximately November 2011. The EA will most likely begin after plan formulation is complete and prior to the AFB. In addition, the public can provide comments at anytime during the feasibility study process to the study's project manager at the following address:

U.S. Army Corps of Engineers, Fort Worth District  
ATTN: Big Fossil Creek Watershed Project Manager, CESWF-PM-C  
P.O. Box 17300  
Fort Worth, TX. 76102-0300

Comments and responses are documented by the date the comment was received, and provided as an attachment which follows the document from the first ATR through Washington D.C. level review of the final feasibility report expected May 2012. This includes comments from all ATRs and comments received from the public throughout the study process.

All published reports can be found at the Fort Worth District's website ([www.swf.usace.army.mil](http://www.swf.usace.army.mil)) as well as directions for obtaining any information that may be disclosed under the Freedom of Information Act (Public Law 89-554, 80 Stat. 383; amended 1996, 2002, 2007).

## **8. PCX COORDINATION**

Review Plans for decision documents and supporting analyses outlined in EC 1105-2-410 are coordinated with the appropriate PCXs based on the primary purpose of the basic decision document to be reviewed. The lead PCX for this study is the FRM PCX at South Pacific Division in San Francisco, California. Additionally, the FRM PCX will coordinate with the Cost Engineering Directory of Expertise (DX) to conduct ATR of cost estimates, construction schedules and contingencies. The FRM PCX will also coordinate with the Ecosystem Restoration PCX (ECO-PCX) to determine a lead to conduct ATR of the ecosystem restoration component of the study.

## **9. MSC APPROVAL**

The MSC that oversees the home district is responsible for approving the Review Plan. Approval is provided by the MSC Commander. The commander's approval should reflect vertical team input (involving district, MSC, PCX, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. Changes to the Review Plan should be approved by following the process used for initially approving the Review Plan. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project.

## **10. REVIEW PLAN POINTS OF CONTACT**

Questions and/or comments on this Review Plan can be directed to the following points of contact:

- U.S. Army Corps of Engineers, Fort Worth District  
ATTN: Big Fossil Creek Watershed Project Manager, CESWF-PM-C  
P.O. Box 17300  
Fort Worth, TX. 76102
- U.S. Army Corps of Engineers, Southwestern Division  
ATTN: Chief of Planning & Policy Division, CESWD-PDS-P  
1100 Commerce St.  
Dallas, TX. 75242
- U.S. Army Corps of Engineers, South Pacific Division  
ATTN: FRM-PCX Program Manager, CESPDPDS-P  
1455 Market St.  
San Francisco, CA 94103

**ATTACHMENT 2: ATR CERTIFICATION TEMPLATE**

**Big Fossil Creek Watershed Interim Feasibility Study  
Upper Trinity Basin Feasibility Study**

**Certification by Review Team Members**

I certify that the study and review process required to be performed under my responsibility has been completed and the technical work is generally in accord with Corps regulations, standard report requirements and customer expectations.

**Review Team Member**

**Date**

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**Big Fossil Creek Watershed Interim Feasibility Study  
Upper Trinity Basin Feasibility Study**

**STATEMENT OF AGENCY TECHNICAL REVIEW**

**COMPLETION OF AGENCY TECHNICAL REVIEW  
BIG FOSSIL CREEK WATERSHED INTERIM FEASIBILITY STUDY**

The Fort Worth District has completed the feasibility report for the Big Fossil Creek Watershed Interim Feasibility Study, Upper Trinity Basin Feasibility Study. Notice is hereby given that an Agency Technical Review, that is appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Review Plan.

During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The Agency Technical Review was accomplished by a team composed of staff from multiple districts. All comments resulting from Agency Technical Review have been resolved.

(Signature) \_\_\_\_\_

Name  
Agency Technical Review Team Leader  
Big Fossil Creek Watershed Interim Feasibility Study

\_\_\_\_\_  
Date

(Signature) \_\_\_\_\_

Name  
Project Manager  
Big Fossil Creek Watershed Interim Feasibility Study

\_\_\_\_\_  
Date

**ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS**

<b><u>Term</u></b>	<b><u>Definition</u></b>	<b><u>Term</u></b>	<b><u>Definition</u></b>
AAHU	Average Annual Habitat Unit	HQUSACE	Headquarters, U.S. Army Corps of Engineers
AFB	Alternative Formulation Briefing	HTRW	Hazardous and Toxic Waste
ATR	Agency Technical Review	IBI	Index of Biological Integrity
DQC	District Quality Control	IEPR	Independent External Peer Review
DX	Directory of Expertise	IRC	Issue Resolution Conference
EA	Environmental Assessment	MSC	Major Subordinate Command
EC	Engineer Circular	NCTCOG	North Central Texas Council of Governments
EIS	Environmental Impact Statement	NEPA	National Environmental Policy Act
EPA	Environmental Protection Agency	OEO	Outside Eligible Organization
ER	Engineering Regulation	PCX	Planning Center of Expertise
FONSI	Finding of No Significant Impact	PDT	Project Delivery Team
FRM	Flood Risk Management	PMP	Project Management Plan
FSM	Feasibility Scoping Meeting	RTS	Regional Technical Specialist
HEC	Hydrologic Engineering Center	SET	Science and Engineering Technology
HEC-FDA	HEC – Flood Damage Reduction Analysis	SWD	Southwestern Division
HEC-HMS	HEC – Hydrologic Modeling System	TWDB	Texas Water Development Board
HEC-RAS	HEC – River Analysis System	USFWS	U.S. Fish and Wildlife Service
HEP	Habitat Evaluation Procedures	USACE	U.S. Army Corps of Engineers
HSI	Habitat Suitability Index	WRDA	Water Resources Development Act
HU	Habitat Unit		