DEPARTMENT OF THE ARMY
US ARMY ENGINEER DIVISION, SOUTHWESTERN
1100 COMMERCE STREET, SUITE 831
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 Cibolo Creek 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 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

Cibolo Creek Interim Feasibility Study
Guadalupe and San Antonio River Basins, Texas

Fort Worth District

August 21, 2009

US Army Corps
of Engineers ®

REVIEW PLAN

Cibolo Creek Interim Feasibility Study
Guadalupe and San Antonio River Basins, Texas

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the Cibolo Creek Interim Feasibility Study, Guadalupe and San Antonio River Basins, Texas.

b. References

(1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 01 July 2009
(2) Engineering Circular (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
(5) Project Management Plan for Cibolo Creek Interim Feasibility Study, 23 March 2008
(6) Feasibility Cost Sharing Agreement, 20 Feb 2009

c. 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 Project Management Plan (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 Envirnomental 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

(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 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 polices, 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 Corps models) or approval (for non-Corps 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 (E&C) 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.** The purpose of the study is to indentify and evaluate Flood Risk Management (FRM) and Ecosystem Restoration (ER) options in the Cibolo Creek Watershed through a feasibility study. The decision document will study, ecosystem restoration measures such as best management practices, recharge structures, and measures implemented in combination with potential flood risk management measures will be evaluated. Flood risk management measures that will be evaluated could include upstream detention, channel modifications, bypass channels, and evacuation of the floodplain. The project is a General Investigations and the feasibility phase is cost shared 50/50 with the projects non-federal sponsor. If this decision document is approved by the Chief of Engineers, implementation of the recommended plan will require Congressional authorization

b. **Study Description.** Cibolo Creek Basin, which encompasses approximately 534,007 acres (834 square miles), originates in the area of southwestern Kendall County, approximately 38 miles northwest of downtown San Antonio, Bexar County, Texas. It flows in an easterly and southeasterly direction, passing through the communities of Boerne, Bulverde, Selma, Universal City, Schertz, and Cibolo. The confluence of Cibolo Creek with the San Antonio River is located north of Karnes City in Karnes County.

At its headwaters, Cibolo Creek is a small stream with large grained rocks, boulders, and limestone cliffs typical of a stream in the Edwards Aquifer Recharge Zone. It is a clear-running perennial stream from several springs located in the headwaters. As the creek transverses the Edwards Plateau it becomes a flood dominated ephemeral creek with a few persistent pools, but does not flow most of the year. Upon entering the Texas Blackland Prairie Cibolo Creek once again becomes perennial and slower moving, supporting aquatic life year round. The channel does not become a wide, deep meandering channel until near its confluence with the San Antonio River.

This study includes only the portion of the Cibolo Creek watershed Downstream of I-10 in Kendall County to the lower Interstate Highway 10 crossing in Bexar and Guadalupe Counties. Cibolo Creek forms the boundary between Bexar and Comal counties on the north and between Bexar and Guadalupe County on the east. The study area accounts for approximately 200,000 acres (312 square miles) and has a unique geographic shape, in that it becomes significantly constricted (less than 2.5 miles wide at the narrowest point) as it passes over the Edwards Aquifer Recharge Zone. Overall, it is a relatively long and narrow watershed, averaging about 8 miles in width. Elevations within this portion of the watershed range from 2010 National Geodetic Vertical Datum (NGVD) in the headwaters to 592 feet NGVD at the lower Interstate Highway 10 crossing. The Cibolo Creek 500 year floodplain contains over 2600 structures with a total estimated value above $340 million.

The study area includes outcrops of two major aquifers, the Trinity and the Edwards. Thin, rocky soils and fairly steep slopes characterize both areas. The Edwards aquifer outcrop generally exhibits greater permeability and infiltration of rainfall than the Trinity aquifer outcrop. Stream channels within both aquifer outcrops lose flow to karst features such as fractures, sinkholes, and caves. Flow within the channel while it crosses the recharge zone is relatively infrequent because of the loss of flow that percolates from the channel bottom to serve as recharge for the aquifer.

During the feasibility study, additional project risk will be analyzed in detail and disclosed in the Draft and Final Feasibility Reports. However, generalized project risk can be discussed in terms of proposed alternatives that may be evaluated. There are inherent project risks with all project alternatives as it relates to property and population. 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. If a substantial risk to the public as a result of a proposed alternative is identified during the feasibility study, the review plan will be revised to incorporate the identified risk. The Cibolo Creek Interim Feasibility Study is a 3.9 million dollar multipurpose ecosystem restoration and flood risk management study. The total project cost could be between $60-80 million.

c. **Factors Affecting the Scope and Level of Review.** This study contains influential scientific information or assessment, and it will have a significant economic, environmental or social affects to the nation. Interagency interest is limited to the coordination required by federal law. The Cibolo Creek Interim Feasibility Study is highly controversial in nature and close coordination with the sponsor and other Federal agencies such as the USFWS and USGS is expected to frequently occur.

Significant safety issues have been presented in relation to this study. The October 17, 1998 flood was the largest event on record for Cibolo Creek with a stage of 35.37 feet and a discharge of over 98,000 cfs. According to the City of Schertz, this event flooded over 300 homes and caused over $3.3 million worth of damage in the Cibolo Creek watershed. Statewide this storm system resulted in over 31 people drowned and property damage of about $750 million however, it is unknown if anybody drowned within the Cibolo Creek watershed.

Currently, there is not a recommended project for this study however the total project cost is estimated to be between $60-80 million. Methods and models used in this study are typical of all Corps flood damage reduction studies with little room for interpretation and are not expected to change prevailing practices on this or future flood damage reduction studies. An IEPR is necessary for this project and will occur after a final feasibility report is prepared.

d. In-Kind Contributions. The sponsor provided services valued at $127,025 for the Cibolo Creek study; this amount will be credited to the sponsor's cost share value. Products submitted by the non-Federal sponsor for in-kind credit will be reviewed by the PDT as required by the 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 Civil Works Review Board (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 Planning Center of Expertise for Flood Damage Reduction (PCX) and Ecosystem Restoration. 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 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 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 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. As the Cost Engineering Center of Expertise, 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 geographic 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, 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 be 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.

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 Eligible Outside Organization (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. Engineering Circular (EC) 1105-2-408 requires external peer reviews for projects where information is based on novel methods, presents complex challenges for interpretation, contains precedent-setting methods or models, presents conclusions that are likely to change prevailing practices, addresses important public safety risks (e.g. designs that include floodwalls) or is likely to affect policy decisions that have a significant impact. An IEPR is expected to be required for this study given the highly controversial nature of the Cibolo Creek project.

c. Products for Review. 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, an IEPR will be coordinated with the Planning Center of Expertise for Flood Damage Reduction (PCX) and Ecosystem Restoration. The IEPR 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. IEPR will be completed on the following documentation:

- Draft Feasibility Report

d. Required IEPR Panel Expertise. The expertise and disciplines represented on the IEPR team reflect the significant disciplines involved in the planning effort. The IEPR team consists of 3 to 4 team members with minimum of Master's level education in the following functional areas:

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 design of earthen dams and detention ponds, the use of non-structural systems as they apply to flood proofing, warning systems, and evacuation, and the use of HEC computer modeling systems.

Geotechnical: Team member will have extensive experience in the design of earthen dams and detention ponds, pre- and post-construction evaluation, and rehabilitation. A certified professional engineer is strongly recommended.

Economics: Team member will have extensive experience in large scale flood risk management projects and a thorough understanding of HEC-FDA.

Environmental: Team member should be familiar with the habitat, fish and wildlife that may be affected by the Cibolo Creek project alternatives.

e. Documentation of IEPR. DrChecks review software will be used to document IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 3. The OEO will be responsible for compiling and entering comments into DrChecks. The IEPR team will prepare a Review Report that will accompany the publication of the final report for the project 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.

The final Review Report will be submitted by the IEPR panel no later than 60 days following the close of the public comment period for the draft decision document. The report will be considered and documentation prepared on how issues were resolved or will be resolved by the District Commander before the district report is signed. The recommendations and responses will be presented to the CWRB by the District Commander with an IEPR panel or OEO representative participating, preferable in person.

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 (including the certification/approval status of each model) and engineering models 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 Cibolo Creek in Kendall and Bexar County, TX 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. 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 were developed for different times during the period of analysis (at year 1, 15, 25, and 50), and HUs are 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 assistance from the Texas Parks and Wildlife Department (TPWD) and 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 riparian corridor structure. The team decided it was appropriate to measure the existing habitat value of the current vegetation state, even though the restoration measures were for converting or restoring existing vegetation to riparian woodlands. The following species, indicative of healthy ecosystems within the Cibolo Creek Watershed, were used for the habitat evaluations.

    • Riparian Woodlands: raccoon, barred owl, fox squirrel, green heron
    • Grasslands: red-tailed hawk, meadowlark, scissor-tailed flycatcher, eastern cottontail

  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 as discussed in the Introduction.

- Environmental Protection Agency's (EPA) Habitat Assessment Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (Not Certified). This model was used in conjunction with Habitat Evaluation Procedure (HEP) because HEP gives extremely low scores (sometimes zero scores) for aquatic conditions when water is not present and provides quality information when water is present. The Environmental Protection Agency (EPA) developed a Habitat Assessment model using Rapid Bioassessment Protocols to analyze the physical characteristics of

habitat types. Therefore, a portion of the EPA Habitat Assessment was used for the aquatic habitat assessments, allowing the study team to quantify the existing value of the aquatic resources to establish a baseline for project evaluation to the extent practical.

The EPA Habitat Assessment is described in depth in Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrate, and Fish, Second Edition (Manuel Barbour 1999). http://www.epa.gov/owow/monitoring/rbp/index.html. There are several protocols that can be used to complete an in-depth analysis, but only the Habitat Assessment Field Data Sheet was completed for this habitat analysis. There are forms for high or low gradient stream, with a few minor measurement differences. The analysis measures ten parameters including the epifaunal substrate/available cover, embeddedness or pool substrate characterization (depending on whether it is a high or low gradient stream), velocity/depth combinations or pool variability, channel flow status, channel alteration, frequency of riffles or channel sinuosity, bank stability, bank vegetation protection, and riparian zone width. Each parameter is given a score from 1-20 for a total score of 200 possible points.

Each survey point has a score from 0 to 200; these scores are then averaged to compose a segment value for the existing condition. For the projection of Future without-Project condition, the team predicted expected changes for years 1, 15, 25, and 50 and completed additional field data sheets to document those expected changes. This will also be done after project features are developed for the future with-project projections. Using the Ultimate Land Use data provided by the sponsor, our projections held true, in that the remaining segments will experience a similar degradation pattern as Cibolo Creek. Each segments score was then normalized to produce a Rapid Bioassessment Protocol Index (RBPI), which is similar to the Habitat Stability Index (HSI) using HEP, where scores range from 0.0 to 1.0, with 1.0 representing the highest habitat quality possible. The RBPI was then multiplied by acres of stream to obtain aquatic RBPU's. The remaining runs of the model were accomplished similar to HEP with culmination of Average Annual Rapid Bioassessment Protocol Units (AARBPU)

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

- HEC-RAS 4.0. 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 will be used for steady flow analysis to evaluate the future without- and with-project conditions in the Cibolo Creek watershed.

- HEC-HMS 2.2.2. 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, for its efficiency and reliability in modeling the terrain present in Kendall and Bexar County, which requires the development of routing data for approximately 190 reaches to address cross flow areas between Cibolo Creek. Some testing was done with the alpha and beta models of HEC-HMS 3.4 as HEC.

- HSPF 12. Hydrologicial Simulation Program–FORTRAN, known as HSPF, is a mathematical model developed under U.S. Environmental Protection Agency sponsorship to simulate hydrologic and water-quality processes in natural and man-made water systems. HSPF uses a time history of rainfall, temperature, evaporation, and parameters related to geology, soils, and land use to simulate hydrological processes in a watershed. The result of an HSPF simulation is a time history of quantity of water transported over the land surface to stream channels and through various soil zones down to the groundwater aquifers. HSPF can produce a time history of water quantity at any point in the watershed. HSPF was used in the Cibolo Creek watershed to simulate

streamflow and groundwater recharge for current and possible future scenarios that include flood-control/recharge-enhancement structures.

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, completed 20 September 2007
- AFB Documentation, anticipated October 2010
- Draft Feasibility Report, anticipated January 2012
- Final Feasibility Report, anticipated May 2012

b. IEPR Schedule and Cost. The IEPR will be completed prior to submission of documentation to the Civil Works Review Board and State and Agency review of the Final Feasibility Report. IEPR cost for the draft feasibility report is expected to be $150,000- $200,000. These costs are cost-shared with the study's non-federal sponsors. ATR will be completed on the following documentation:

- Draft Feasibility Report, anticipated January 2012

c. Model Certification/Approval Schedule and Cost.

1) Engineering (HEC) models are not certifiable by planning.

2) Environmental Protection Agency's (EPA) Habitat Assessment Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers has a package under development to initiate the certification effort. At this time schedule and cost are not known. Coordination with the Ecosystem Restoration (ER) 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 EPA since 1999, 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 U.S. Fish and Wildlife Service on several independent studies currently underway with similar aquatic habitat conditions has led the 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 environmental assessment for 30 days occurring approximately January 2012. The environmental assessment 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: Cibolo Creek 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 in October 2010 through Washington D.C. level review of the final feasibility report expected May 2012. This includes comments from all ATRs, IEPR 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) 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 Planning Center(s) of Expertise (PCXs) based on the primary purpose of the basic decision document to be reviewed. The lead PCX for this study are the Flood Risk Management (FRM) PCX at South Pacific Division in San Francisco, CA and the Ecosystem Restoration (ER) PCX at the Mississippi Valley Division in Vicksburg, MS. Additionally, the FRM PCX will coordinate with the Cost Engineering Directory of Expertise (DX) at the Walla Wall District to conduct IEPR and ATR of cost estimates, construction schedules and contingencies.

9. MSC APPROVAL

The MSC that oversees the home district is responsible for approving the review plan. Approval is provided 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 RP is a living document and may change as the study progresses. Changes to the RP should be approved by following the process used for initially approving the RP. 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: Cibolo Creek 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, CESPD-PDS-P
  1455 Market St.
  San Francisco, CA 94103

- U.S. Army Corps of Engineers, Mississippi Valley Division
  ATTN: ER-PCX Program Manager, CEMVD-PDS-P
  1400 Walnut St.
  Vicksburg, MS 39180

ATTACHMENT 2: ATR CERTIFICATION TEMPLATE

CIBOLO CREEK, SAN ANTONIO, TEXAS
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**

CIBOLO CREEK, SAN ANOTONIO, TEXAS
FEASIBILITY STUDY

STATEMENT OF AGENCY TECHNICAL REVIEW

COMPLETETION OF AGENCY TECHNICAL REVIEW
CIBOLO CREEK WATERSHED FESIBILTY STUDY

The Fort Worth District has completed the feasibility report of the Cibolo Creek Project. 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 independent technical review was accomplished by and Agency team composed of staff from multiple districts. All comments resulting from ITR have been resolved.

(Signature) _____ _____
Name Date
Agency Technical Review Team Leader
Cibolo Creek Project

(Signature) _____ _____
Marie Vanderpool Date
Project Manager
Cibolo Creek Project

ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and maintenance
DPR	Detailed Project Report	OMB	Office and Management and Budget
DQC	District Quality Control	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DX	Directory of Expertise	OEO	Outside Eligible Organization
EA	Environmental Assessment	OSE	Other Social Effects
EC	Engineer Circular	PCX	Planning Center of Expertise
EIS	Environmental Impact Statement	PDT	Project Delivery Team
EO	Executive Order	PAC	Post Authorization Change
ER	Ecosystem Restoration	PMP	Project Management Plan
FDR	Flood Damage Reduction	PL	Public Law
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FRM	Flood Risk Management	QA	Quality Assurance
FSM	Feasibility Scoping Meeting	QC	Quality Control
GRR	General Reevaluation Report	RED	Regional Economic Development
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RTS	Regional Technical Specialist
IEPR	Independent External Peer Review	USACE	U.S. Army Corps of Engineers
ITR	Independent Technical Review	WRDA	Water Resources Development Act
LRR	Limited Reevaluation Report		
MSC	Major Subordinate Command		