

# **REVIEW PLAN**

***Lower Colorado River Basin, Hays County, TX  
Interim Feasibility Study***

***Fort Worth District***

**MSC Approval Date: *December 8, 2010***

**Last Revision Date: *December 8, 2010***



**US Army Corps  
of Engineers®**

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## 1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Lower Colorado River Basin (LCRB), Hays County, Texas, Interim Feasibility Study. The study goal is to ultimately authorize a flood risk management project with aquatic ecosystem restoration and recreation components in Northern Hays County to reduce the risk of damages and loss of life from the flooding in the Pedernales, Barton Creek, Onion Creek, Bear Creek, and Little Bear Creek watersheds within Hays County.

### b. References

- (1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010
- (2) EC 1105-2-412, Assuring Quality of Planning Models, xxx 2010 (Supercedes EC1105-2-407)
- (3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
- (4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
- (5) Project Management Plan for LCRB, Hays County TX, Interim Feasibility Study
- (6) Southwestern Division Quality Assurance Plan

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-209, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

- (1) District Quality Control/Quality Assurance (DQC). All **decision documents** (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home Major Subordinate Command (MSC).
- (2) Agency Technical Review (ATR). ATR is mandatory for all **decision documents** (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published US Army Corps of Engineers (USACE) guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by a designated Risk Management Organization (RMO) and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE

personnel 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 may be required for **decision documents** under certain circumstances. 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. A risk-informed decision, as described in EC 1165-2-209, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR: Type I is generally for decision documents and Type II is generally for implementation products.
  - (a) Type I IEPR. Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and an biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all the underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-209.
  - (b) Type II IEPR. Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.
- (4) Policy and Legal Compliance Review. All **decision documents** will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in 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. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.
- (5) Cost Engineering Review and Certification. All **decision documents** shall be coordinated with the Cost Engineering Directory of Expertise (DX), located in the Walla Walla District. The DX, or in some circumstances regional cost personnel that are pre-certified by the DX, will conduct the cost ATR. The DX will provide certification of the final total project cost.

- (6) Model Certification/Approval. EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined 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 use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR. EC 1105-2-412 does not cover engineering models used in planning. 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. Use of engineering models is also subject to DQC, ATR, and IEPR.

## **2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION**

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for decision documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is Flood Risk Management (FRM) PCX.

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to conduct ATR of cost estimates, construction schedules and contingencies.

It is possible that Ecosystem Restoration (ECO) and Recreation components will be incorporated into the alternatives. As such, the FRM PCX will coordinate with the ECO PCX as necessary to ensure that review teams with the appropriate expertise are assembled.

Since this study is primarily FRM, it is assumed a life safety factor will be identified. As such, the RMC may need to be involved in the ATR at the Alternative Formulation Briefing and beyond. The FRM PCX will be responsible for ATR and IEPR, and will determine if the RMC should be involved. If RMC involvement is required, the FRM PCX shall coordinate any RMC involvement in reviews.

## **3. STUDY INFORMATION**

**Decision Document.** An Interim Feasibility Report is to be prepared for LCRA and Hays County as authorized by the River and Harbor Act, adopted March 2, 1945 (Resolutions by the Committee on Commerce, United States Senate, adopted August 4, 1936 and the River and Harbor Acts of August 26, 1937 and March 2, 1945), quoted below.

*Section 6: "The Secretary of War is hereby authorized and directed to cause preliminary examinations and surveys to be made at the following named localities... Colorado River, Texas..."*

The above authority has provided for many studies in the Colorado River Basin, including a basin wide analysis completed in 2006 which recommended several areas within the basin for more detailed studies. This study and its associated reports are an interim response to the larger basin wide study authorized by the primary authority above.

A specific authority for Onion Creek, cited below, was more recently adopted, May 6, 1998, with a Resolution by the Committee on Transportation and Infrastructure, U.S. House of Representatives for improvements to the Onion Creek watershed in the interest of flood damage reduction, environmental restoration and protection, and other related purposes. This secondary authority specifically addresses the sub-basin that is phase 1a of this study.

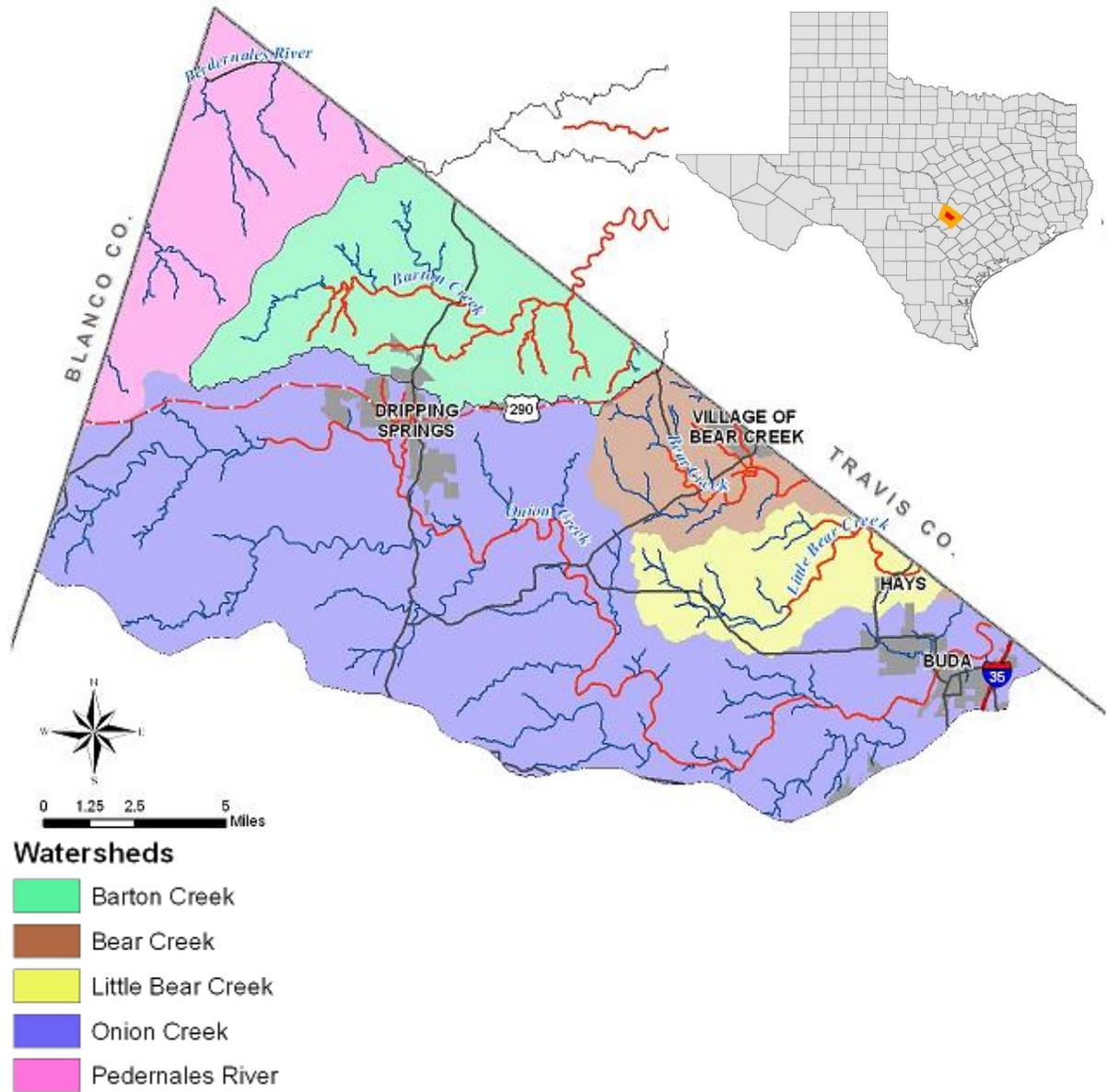
*“Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That the Secretary of the Army is requested to review the report of the Chief of Engineers on the Colorado River, Texas, published as House Document 361, 71st Congress, 2nd Session, and other pertinent reports, with a view to determine if improvements to the Onion Creek watershed in the interest of flood damage reduction, environmental restoration and protection, and other related purposes are advisable at the present time.”*

If this interim feasibility report and Environmental Analysis recommend a plan, and the report, analysis and plan are approved by the Chief of Engineers, implementation of the recommended plan will require Congressional authorization.

**a. Study/Project Description.** The LCRB, Hays County Interim Feasibility Study is a flood risk management study of the Pedernales, Barton Creek, Onion Creek, Bear Creek, and Little Bear Creek watersheds in northern Hays County, Texas (see study area map on the following page). Though the watersheds extend beyond county lines this study addresses only those portions contained within Hays County. However, the remainder of these watersheds are being addressed in other interim responses ongoing or planned with the appropriate cities and counties as partners, and each study is scoped such that it considers the results of the modeling in watersheds at the county line to ensure there are no disparities in the hydraulic modeling as they move from one county into the next. For example, a study has already been completed for Onion Creek within adjacent Travis County, and as part of the technical analysis for this study, the PDT will ensure that the modeling where the Onion Creek watershed reaches the eastern Hays County line, it matches with the upstream modeling of Onion Creek within Travis County.

The study is tiered off the Lower Colorado River Basinwide study completed in 2006. It consists of an analysis of the problems, needs and opportunities present in the Lower Colorado River Basin in Hays County using topographic surveys, hydraulic models and economics reflecting current development, land use changes and the environment within the floodplain. Phase 1a and 1b of interim feasibility study are projected to have a combined total cost of \$1.5 million. The Sponsor may contribute Work In Kind to include provision of recent reports, surveys and mapping; assistance with the development of the structure database; assistance with public meetings and outreach; attendance at meetings; and review of presentations and reports. At this time, the local sponsor chooses not to document and contribute work in kind, but reserves the right to request the Project Management Plan be modified at a later date to include work in kind. Should work in kind be contributed, it will be in accordance with the WIK DRAFT GUIDANCE Draft ver 05271631 available through the SWF Resource Management Division. Additionally, any products accepted as WIK shall be subject to ATR and IEPR. The Lower Colorado River Authority (LCRA) is the local cost sharing

sponsor for this study through an inter-local agreement with Hays County and the affected communities.



The LCRB, Hays County Interim Feasibility Study will be a typical U.S. Army Corps of Engineers flood risk management interim feasibility study with aquatic ecosystem restoration and recreational components assessed and included where practical and economically beneficial. As such it will investigate structural measures such as channel modifications, diversion, and detention; and nonstructural measures such as flood warning systems, raising structures in place and evacuation of the floodplain. Ecosystem restoration is currently not a high priority project output by the sponsor but will be considered during formulation in terms of providing wetland or wildlife habitat areas consistent with the sponsor's long term goals and the project goal of flood risk management. Recreation development will be pursued, but only when it is compatible with flood risk management

alternatives and supported by the sponsor. This study has just been initiated; therefore, there is no estimated project cost at this time.

- b. Factors Affecting the Scope and Level of Review.** This study does not contain influential scientific information or assessment, nor is it expected to have significant economic, environmental or social affects to the nation. Interagency interest is limited to the coordination required by federal law. Two children drowned in the 1970 flood when the boat that was rescuing them tipped over. Two more people died in 1997 after attempting to drive through high water. 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 currently a recommended project for this study, and the 905 (b) was completed at the basin level with recommendations for areas for further study with no projected project costs, therefore project costs can not be provided at this time. 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 Corps flood risk management studies with little room for interpretation and are not expected to change prevailing practices on this or future flood risk management studies. Ecosystem restoration models employed will be those historically used by the Corps of Engineers in partnership with the U.S. Fish and Wildlife Service and are not expected to change prevailing practices for future multipurpose or ecosystem restoration studies. Because of the life safety factors associated with all flood risk management studies, Type I IEPR is required during the feasibility study and Type II IEPR is anticipated during design. Type I IEPR will be conducted concurrent with public review of the draft interim feasibility report. The scope, timing and level of review for Type II IEPR will be determined once a recommended plan is selected and the review plan is updated for the implementation phase of the project.
- c. In-Kind Contributions.** Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. At this time, the local sponsor chooses not to document and contribute work in kind, but reserves the right to request the Project Management Plan be modified at a later date to include work in kind. The Sponsor may contribute Work In Kind to include provision of recent reports, surveys and mapping; assistance with the development of the structure database; assistance with public meetings and outreach; attendance at meetings; and review of presentations and reports. Should work in kind be contributed, it shall be in accordance with the WIK DRAFT GUIDANCE Draft ver 05271631 available through the SWF Resource Management Division. Additionally, any products accepted as WIK shall be subject to ATR and IEPR.

#### **4. DISTRICT QUALITY CONTROL (DQC)**

- a. Documentation of DQC.** DQC shall be consistent with the PMP and the SWD QA Plan. DQC shall be completed on each deliverable prior to submission to the PM or planner for incorporation into the decision document. DQC comments and responses shall be documented in Dr. Checks. This comment report shall be provided to the ATR team lead prior to the ATR kick off meeting.
- b. Products to Undergo DQC.** DQC should review any technical assumptions, modeling parameters, and calculations as well as the content and format of the technical appendix submitted and should take place at a minimum prior to the ATR's for FSM, AFB, Draft Report and Final Report. Additionally, any deliverables from contractors or products provided by the non-Federal sponsor should undergo DQC prior to being incorporated into the analysis used to generate technical information and products.

- c. **Required DQC Expertise.** DQC shall be conducted by the technical team member’s first line supervisor or a designated senior member of his/her staff. In the event products from outside sources are incorporated the first line supervisor may delegate this DQC to the technical team member if it is determined that he/she has sufficient experience, objectivity, and knowledge of Corps guidance to properly evaluate the models/documents.

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

- a. **Products to Undergo ATR.** 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 (PCX) for Flood Risk Management (FRM) and any adopted ecosystem restoration components will be coordinated with the PCX for Ecosystem Restoration (ECO). 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, anticipated Aug 2012
- AFB Documentation, anticipated Nov 2013
- Draft Feasibility Report, anticipated Nov 2014
- Final Feasibility Report, anticipated May 2015

Additional Issue Resolution Conferences (IRCs) may be required throughout the study if a significant policy issue arises. 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

**b. Required ATR Team Expertise.**

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. Typically, the ATR lead will also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	The Planning reviewer should be a senior water resources planner with experience in flood risk management projects, water resources and watershed planning and have experience relevant

	to issues to be determined throughout the course of the study.
Economics	Team member will have extensive experience in both urban and agricultural flood risk management projects and a thorough understanding of HEC-FDA. Team member should also be aware and knowledgeable regarding the affects and issues surrounding undocumented immigrants.
Environmental Resources	Team member will have independently completed EA/EIS's and be well versed in the NEPA process, partnerships with other environmental resource agencies and environmental concerns and constraints within urban settings; will have knowledge and experience regarding aquifer draws and recharge as well as rare and endangered cave dwelling fauna.
Cultural Resources	Team member will have experience with 106 actions and documentation including mitigation for historical structures and archeological artifacts, both of which are present in the study area.
Hydrology	Team member should be an expert in the field of urban hydrology and hydraulics, have a thorough understanding of flash flooding, stationary tropical systems, the effects of management practices and low impact development on hydrology, the use of non-structural systems as they apply to flood proofing, warning systems, and evacuation, and the use of HEC computer modeling systems.
Hydraulic Engineering	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 non-structural systems as they apply to flood proofing, warning systems, and evacuation, and the use of HEC computer modeling systems.
Geotechnical Engineering	Team member will have knowledge and experience with aquifers, limestone and loam. A certified professional engineer is strongly recommended.
Civil Engineering	Team member will have experience with utility relocations, interior drainage requirements, and application of non-structural flood damage reduction measures. A certified professional engineer is suggested.
Structural Engineering	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, and utility penetrations. A certified professional engineer is suggested.
Cost Engineering	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.
Real Estate	Team member will be have at least 5 years experience with flood risk management studies and be familiar with urban and agricultural development planning and acquisition strategies.

**c. 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 order 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 team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- 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;
- Identify and summarize each unresolved issue (if any); 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 the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the AFB, draft report, and final report. A sample Statement of Technical Review is included in Attachment 2.

**6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)**

- a. **Decision on IEPR.** It is expected that Type I IEPR will be required for this study, however it will not be included in the study scope and budget until the PMP is revised upon completion of the FSM. This study is not expected to contain influential scientific information or assessments, nor is it expected to have significant economic, environmental or social affects to the nation. Interagency interest is limited to the coordination required by federal law. Two lives were lost as a result of flooding in 1970. 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 currently a recommended project for this study, therefore, no project cost can be provided at this time. 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. Flood risk management methods and models used in this study are typical of all Corps flood risk management studies with little room for interpretation and are not expected to change prevailing practices on this or future studies. Ecosystem restoration models employed will be those historically used by the Corps of Engineers in partnership with the U.S. Fish and Wildlife Service and are not expected to change prevailing practices for this or future studies. Because of the life safety factors associated with all flood risk management studies, Type I IEPR is required during the feasibility study and Type II IEPR is anticipated during design. Type I IEPR will be conducted concurrent with public review of the draft interim feasibility report. Type I IEPR will address safety and assurance questions defined in EC 1165-2-209, Appendix D, paragraph 2.c.(3). The scope, timing and level of review for Type II IEPR will be determined once a recommended plan is selected and the review plan is updated for the implementation phase of the project.
  
- b. **Products to Undergo Type I IEPR.** Products for review will include; Draft Interim Feasibility Report and Draft Environmental Assessment, documentation of all ATR comments and how they were resolved, documentation and guidance resulting from the FSM, and AFB report conferences, documentation of all public and agency review comments to date and how they were resolved, any other documents providing specific direction to the PDT, a copy of the proposed mailing list, and a reference list for any other documents used as a foundation for the analyses conducted during the study. Should the PDT or the ATRT find during the reviews for the FSM or the AFB that one of the triggers for IEPR specifically mentioned in EC 1165-2-209 has been met, the IEPR panel may be assembled earlier to review those materials/models that raise concern.
  
- c. **Required Type I IEPR Panel Expertise.**

IEPR Panel Members/Disciplines	Expertise Required
Economics	The economics panel member should have at least 10 years experience directly related to water resource economic evaluation or review; a comprehensive understanding of social well being and regional economic development as well as

	traditional Corps national economic development benefits; 5 or more years experience working with HEC-FDA; 2 or more years experience reviewing water resource economic documents justifying construction efforts; and a masters degree or higher in economics
Environmental	The environmental panel member should have at least 10 years of demonstrated experience in evaluating and conducting NEPA impact assessments, including cumulative effects analyses for complex, multi-objective public works projects with competing trade-offs. This should include experience determining scope and appropriate methodologies for a variety of projects/programs with high public and interagency interests as well as impacts to adjacent sanative habitats. The panel member should be familiar with the evaluation of complex relationships and dynamics for aquatic and riparian ecosystems and able to assess the consequences of altering environmental conditions. He/she should have a masters degree or higher in a degree related to environmental studies and be active in a related professional society.
Hydraulic Engineering	The engineer should be a registered professional engineer with a) a minimum 10 years experience in hydraulic engineering with emphasis on large public works projects, or b) a professor from academia with 15 or more years in hydraulic theory and practice. The engineer should be familiar with USACE application of risk and uncertainty analyses in flood risk management studies and with standard USACE hydrologic and hydraulic computer models. The engineer should have a masters degree or higher in engineering and actively participate in professional engineering societies/organizations to ensure he/she is capable of evaluating the Safety Assurance Review aspects of projects.
Plan formulation	The plan formulation panel member should have 10 or more years of planning experience with at least 5 of those working with or for USACE on civil works projects so that he/she is familiar with USACE civil works planning policies, methodologies and procedures. The panel member should have a masters degree or higher in a planning related field of study.

**d. Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, Appendix D. Panel comments will be compiled by the OEO and 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 4.d above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document 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 OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

## 7. MODEL CERTIFICATION AND APPROVAL

- a. **Planning Models.** The following planning models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.4 (Flood Damage Analysis)	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 on Bear Creek, Flat Creek, Garlic Creek, Little Bear Creek, Onion Creek, Spring Hollow, York Creek, Barton Creek, Calohan Creek, Fitzhugh Creek, Hamilton Creek, Pedernals River, Roy Creek, Sycamore Creek and the associated tributaries and springs as allowable by Corps guidance (estimated 139 stream miles) to aid in the selection of a recommended plan to manage flood risk.	Certified
Habitat Evaluation Procedure (HEP)	The United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980) (certified) will be 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).	Approval/Certification needs for specific HSI models will be determined once the appropriate models have been identified.

	<p>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.</p> <p>The USFWS, with assistance from the Texas Parks and Wildlife Department (TPWD) and the USACE Fort Worth District, will complete 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 is to use models that contain variables that measure important components of riparian corridor structure. The team decided it is appropriate to measure the existing habitat value of the current vegetation state, even though the restoration measures are typically for converting or restoring existing vegetation to riparian woodlands. Species determined by the USFWS during development of the Planning Aide Letter to be indicative of healthy ecosystems within the Lower Colorado River Watershed, will be used for the habitat evaluations.</p> <p>The specific HSI models to be used in association with HEP are not known at this time. They will be determined during the course of the team’s evaluation of existing conditions and incorporated into the PMP and RP prior to the FSM.</p>	
<p>Habitat Assessment Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers</p>	<p>Environmental Protection Agency’s (EPA) Habitat Assessment Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers (Not Certified). This model will be 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 EPA developed a Habitat Assessment model using Rapid Bioassessment Protocols to analyze the</p>	<p>Not Certified, previously approved for use on other studies.</p>

	<p>physical characteristics of habitat types. Therefore, a portion of the EPA Habitat Assessment is 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.</p> <p>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).  <a href="http://www.epa.gov/owow/monitoring/rbp/index.html">http://www.epa.gov/owow/monitoring/rbp/index.html</a>.  There are several protocols that can be used to complete an in-depth analysis, but only the Habitat Assessment Field Data Sheet will be completed for this habitat analysis. There are forms for high or low gradient stream, with a few minor measurement differences. The analysis will measure 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.</p> <p>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 predicts expected changes for years 1, 15, 25, and 50 and completes 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 are expected to hold true, in that the remaining segments will experience a similar degradation pattern within Hays County. Each segments score is 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 is then multiplied by acres of stream to obtain aquatic RBPU's. The remaining runs of the model will be accomplished similar to HEP with culmination of Average Annual Rapid Bioassessment Protocol Units (AARBPU).</p>	
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- b. Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document:

<b>Model Name and Version</b>	<b>Brief Description of the Model and How It Will Be Applied in the Study</b>
HEC-RAS 4.0 (River Analysis System)	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 along the previously named creeks and tributaries.
HEC-HMS 3.4 (Hydrologic Modeling System)	The Hydrologic Modeling System (HEC-HMS) is designed to simulate the precipitation-runoff processes. Hydrographs produced by the program will be used in conjunction with HEC-RAS for study of water availability, urban drainage, flow forecasting, future urbanization impact, flood damage reduction, floodplain regulation, and systems operation.

**8. REVIEW SCHEDULES AND COSTS**

- a. ATR Schedule and Cost.** ATR will be required for the following documents. Anticipated schedule and cost are listed next to each.
- FSM Documentation, anticipated Aug 2012 - \$30,000
  - AFB Documentation, anticipated Nov 2013 - \$60,000
  - Draft Feasibility Report, anticipated Nov 2014 - \$25,000
  - Final Feasibility Report, anticipated May 2015 - \$10,000

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.

- b. Type I IEPR Schedule and Cost.** IEPR will be conducted after the AFB and prior to public and agency review of the Draft Interim Feasibility Report (anticipated Nov 2014). Cost is expected to be \$50,000, cost shared for the federal employee labor, and will not exceed \$500,000 for the fully federally funded for award of the external contract.
- c. Model Certification/Approval Schedule and Cost.** 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 (ECO) PCX has been initiated by Fort Worth and 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 FSM 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.

## **9. 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, there will be a public meeting 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 Jan 2015. 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: LCRB, Hays County, 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 Aug 2012 through Washington D.C. level review of the Final Interim Feasibility Report expected Aug 2015. This includes comments from all ATRs, IEPR if necessary, 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).

## **10. REVIEW PLAN APPROVAL AND UPDATES**

The Southwestern Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, 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. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

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

Public 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: LCRB, Hays County Project Manager, CESWF-PM-C  
P.O. Box 17300  
Fort Worth, TX. 76102-0300

- U.S. Army Corps of Engineers, Southwestern Division  
ATTN: Chief of Planning & Policy Division, CESWD-PDS-P  
1100 Commerce St.  
Dallas, TX. 75242-1317
- U.S. Army Corps of Engineers, South Pacific Division  
ATTN: FRM-PCX Program Manager, CESPDPDS-P  
1455 Market St.  
San Francisco, CA 94103-1398

**ATTACHMENT 1: TEAM ROSTERS**

<b>Discipline</b>	<b>PDT Member</b>	<b>Contact Information</b>	<b>ATR Team Member</b>	<b>Contact Information</b>
Plan Formulation			TBD	
H&H			TBD	
Civil Design			TBD	
Structural Design			TBD	
Geotechnical			TBD	
Cost Estimating			TBD	
Economics			TBD	
Cultural			TBD	
Environmental			TBD	
Real Estate			TBD	
HTRW			TBD	
Recreation			TBD	

**ATTACHMENT 2: SAMPLE STATEMENT OF DISTRICT QUALITY CONTROL FOR DECISION DOCUMENTS**

**COMPLETION OF DISTRICT QUALITY CONTROL**

The District Quality Control (DQC) has been completed for the *<type of product>* for the LCRB, Hays County TX, Interim Feasibility Study. The DQC was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-209. During the DQC, the accuracy of the data, validity of assumptions, interpretation of model results and the quality and content of the write ups were evaluated by supervisory or senior technical personnel within the district. 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 results.

*SIGNATURE*  
\_\_\_\_\_  
Study Manager  
CESWF-PER-PP

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_  
Chief, Program and Project Management, Civil Branch  
CESWF-PM-C

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_  
Chief, Planning, Environmental and Regulatory Division,  
Planning Branch  
CESWF-PER-P

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_  
Chief, Planning, Environmental and Regulatory Division,  
Environmental Branch  
CESWF-PER-E

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_  
Chief, Engineering and Construction Division, Hydrology  
Branch  
CESWF-EC-H

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_  
Chief, Engineering and Construction Division, Design Branch  
CESWF-EC-D

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_  
Chief, Engineering and Construction Division, Cost Estimating  
and Specifications Section  
CESWF-EC-AC

\_\_\_\_\_  
Date

*SIGNATURE*  
\_\_\_\_\_

\_\_\_\_\_  
Date

Chief, Real Estate Division, Planning and Appraisal Branch  
CESWF-RE-A

**ATTACHMENT 3: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS**

**COMPLETION OF AGENCY TECHNICAL REVIEW**

The Agency Technical Review (ATR) has been completed for the <type of product> for the LCRB, Hays County TX, Interim Feasibility Study. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, 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 results, including whether the product meets the customer’s needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks<sup>sm</sup>.

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
ATR Team Leader  
Office Symbol/Company

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Project Manager  
Office Symbol

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Architect Engineer Project Manager<sup>1</sup>  
Company, location

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Review Management Office Representative  
Office Symbol

**CERTIFICATION OF AGENCY TECHNICAL REVIEW**

Significant concerns and the explanation of the resolution are as follows: Describe the major technical concerns and their resolution.

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Chief, Engineering Division  
Office Symbol

SIGNATURE \_\_\_\_\_ Date \_\_\_\_\_  
Name  
Chief, Planning Division  
Office Symbol

<sup>1</sup> Only needed if some portion of the ATR was contracted

**ATTACHMENT 4: REVIEW PLAN REVISIONS**

<b>Revision Date</b>	<b>Description of Change</b>	<b>Page / Paragraph Number</b>

**ATTACHMENT 5: ACRONYMS AND ABBREVIATIONS**

<b>Term</b>	<b>Definition</b>	<b>Term</b>	<b>Definition</b>
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/Quality Assurance	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
ECO	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	RMC	Risk Management Center
IEPR	Independent External Peer Review	RMO	Review Management Organization
ITR	Independent Technical Review	RTS	Regional Technical Specialist
LCRB	Lower Colorado River Basin	SAR	Safety Assurance Review
LRR	Limited Reevaluation Report	USACE	U.S. Army Corps of Engineers
MSC	Major Subordinate Command	WRDA	Water Resources Development Act