REVIEW PLAN

WHITE OAK BAYOU, TEXAS
FEDERAL FLOOD CONTROL PROJECT
HARRIS COUNTY FLOOD CONTROL DISTRICT
& GALVESTON DISTRICT-USACE

U.S. Army Corps of Engineers
Galveston District

MSC Approval Date: PENDING
Last Revision Date: 11**/14/2012**

US Army Corps
of Engineers ®

WHITE OAK BAYOU, TEXAS
FEDERAL FLOOD CONTROL PROJECT
HARRIS COUNTY FLOOD CONTROL DISTRICT
& GALVESTON DISTRICT-USACE

Feasibility Report

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1. PURPOSE AND REQUIREMENTS

Purpose:
Pursuant to Engineering Circular (EC) 1165-2-214, Civil Works Review Policy; EC 1105-2-412, Assuring Quality of Planning Models; ER 1110-1-12, Quality Management; and ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, a Project Review Plan (RP) has been developed for the White Oak Bayou Federal Flood Control Project General Reevaluation Study. Mooring Basin Modifications. This RP defines the scope and level of peer review for the General Reevaluation Study. The document provides the RP for the study and identifies the District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR) and Independent External Peer Review (IEPR) process for all work conducted as part of the study, including in-house, non-Federal sponsor, and contract work efforts.

a. References

(1) Engineering Circular (EC) 1165-2-214, Civil Works Review Policy, 12 Dec 2012
(2) Engineering Regulation (ER) 1105-2-412 Assuring Quality of Planning Models, 31 March 2011
(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) White Oak Bayou Federal Flood Damage Reduction Plan General Reevaluation Report, Project Management Plan, 8 Dec 2010

b. Requirements. This review plan was developed in accordance with EC 1165-2-214, 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: DQC, ATR, 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 1165-2-214) and planning model certification/approval (per EC 1105-2-412).

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 Center of Expertise (FRM-PCX) located in South Pacific Division.

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies.

3. STUDY INFORMATION

a. Decision Document and Background. The 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. The technical review efforts addressed in EC 1165-2-214 are to augment and complement the policy review processes by addressing compliance with published Army policies pertinent to planning products, particularly policies on analytical methods and the presentation of findings in decision documents. DQC and ATR efforts are to include the necessary expertise to address compliance with published planning policy. Counsel will generally not participate on ATR teams, but may at the discretion of the district or as directed by higher authority. When policy and/or legal concerns arise during DQC or ATR efforts that are not readily and mutually resolved by the Project Delivery Team (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. Legal reviews will be conducted concurrent with ATR of the preliminary, draft, and final feasibility report and NEPA document.

The flood risk management project for Buffalo Bayou, Texas was authorized by the River and Harbors Act of June 20, 1938, the Flood Control Act of 1954 and Public Law 101-640, Section 101(a)(21), dated November 28, 1990, of WRDA 1990.

> "SEC 101(a)(21) *Buffalo Bayou and tributaries, Texas. --The project for flood control, Buffalo Bayou and tributaries, Texas: Report of the Chief of Engineers, dated February 12, 1990, at a total cost of $727,364,000, with an estimated first Federal cost of $403,359,500 and an estimated first non-Federal cost of $324,004,500."*

Construction of Upper White Oak Bayou was authorized by WRDA 1986, Section 401(a) based on a Report of the Chief of Engineers dated June 13, 1978. The proposed project included 9.2 miles of White Oak Bayou channel enlargement, rectification, and partial concrete paving upstream of the existing Federal channel to the north side of Jersey Village at stream mile 19.9. The proposed project also included channel modifications to Cole Creek and Vogel Creek; nonstructural floodplain management upstream of the channel improvements; and recreation, aesthetic, and beautification features.

b. Study/Project Description. The study area is located in Harris County, Texas. The study area includes the main channel of White Oak Bayou, Texas, extending from its confluence with Buffalo Bayou in downtown Houston upstream to its origin in northwest Harris County, covering approximately 25 miles through the City of Jersey Village and the City of Houston, Texas. White Oak Bayou drains approximately 110 square miles and is approximately 90

percent developed. Elevations in the watershed vary from approximately 135 feet to approximately 40 feet and the average streambed slope is about 4 feet per mile.

The existing Federal channel in the lower reach of White Oak Bayou was completed in the mid 1970s under the authorization of the Flood Control Acts of 1954 and 1965 for Buffalo Bayou and Tributaries. Improvements included straightening, widening, and low-flow concrete lining of the 10.7-mile reach of White Oak Bayou between its confluences with Buffalo Bayou and Cole Creek.

The current study proposes channel improvements, detention basins, and recreational enhancements along the upper reach of White Oak Bayou between Cole Creek and FM 1960. The three elements are briefly described below.

- Channel improvements: 15.4 miles of earthen channel modifications (widening, deepening) between Cole Creek and FM 1960.
- Detention basins: Four detention basins distributed along the upper reach of White Oak Bayou with a collective volume of nearly 3,400 acre-feet.
- Recreational enhancements: Creation of a linear park/bikeway along White Oak Bayou between Cole Creek and north of West Road. Multi-purpose trails, fields, and play areas will also be incorporated into the detention facilities.

The proposed channel improvements and detention basins offer significant flood damage reduction in the 10% and 4% events, with benefits tapering in the 1% event. In the 10% event, the floodplain is removed from over 96% of structures inundated in the without-project condition. In the 25% event, the floodplain is removed from 66% of structures. The floodplain is removed from approximately 25% of structures in the 1% event.

The on-going general reevaluation study is being performed under Section 211(f) of the Water Resources Development Act of 1996, as amended by WRDA 2007. Section 211(f) gives a non-Federal interest the opportunity to take the lead in the planning, design, and construction for a flood control project in cooperation with the Corps. The local sponsor, Harris County Flood Control District (HCFCD), is assessing the feasibility of flood damage reduction for White Oak Bayou, within Harris County Texas. The feasibility of ecosystem restoration is also being assessed. The Houston/Harris County area is about 50 miles northwest of Galveston, Texas, on the mid to upper Texas coast.

In its role as the local sponsor, HCFCD is leading the planning, design, and construction for the project in cooperation with USACE. Much of the technical work is being performed by contracted consultants. The USACE district office (SWG) is providing HCFCD with guidance regarding Corps policies and process.

A reconnaissance-level study was undertaken to determine whether flood risk management (FRM) benefits produced by FRM improvements along White Oak Bayou are sufficient to offset the costs and environmental consequences of the improvements. The Expedited Reconnaissance Study Report, Harris County Flood Control District, (approved by USACE March 1999), concluded that there is sufficient Federal interest in FRM improvements to conduct more detailed, feasibility-level studies. During reevaluation study efforts, close

coordination is being maintained with resource agencies, interested parties, and local interests. Periodic public meetings have been and will be scheduled.

c. Factors Affecting the Scope and Level of Review. The White Oak Bayou study process is atypical of USACE projects. The HCFCD, as the local sponsor, is charged with leading the study and coordination with USACE. Technical input on the project is provided by HCFCD's consultant, LJA Engineering, Inc. SWG is responsible for providing guidance and direction related to Corps policies and processes as needed. Together the HCFCD and SWG comprise the Project Delivery Team (PDT).

Pursuant to EC 1165-2-214, all decision documents and their supporting analyses will undergo DQC and ATR and may also require IEPR, to "ensure the quality and credibility of the government's scientific information", in accordance with the circular and the quality management procedures of the responsible command. This includes decision documents prepared by prepared by sponsors under Section 211 of WRDA 96. In this effort, SWG will manage DQC, PCX will manage ATR, and HCFCD will contract directly with Battelle to perform the IEPR. ATR and IEPR shall be performed in full adherence to EC 1165-2-214. The draft GRR will need to have a review team assigned by the Planning Center of Expertise (PCX) for Flood Risk Management for the performance of ATR. It is anticipated that this team will be assigned by the PCX or CESWD-SWT acting on behalf of the PCX. It is further anticipated that an Independent External Peer Review (IEPR) be conducted based on the scale of costs and benefits for the project. The scope of the IEPR review, conducted by a qualified team outside of USACE, will address all the underlying planning, engineering, economics and environmental analyses performed.

As a result, the peer review will focus on:

- Review of the planning process and criteria applied.
- Review of the methods of preliminary analysis and design.
- Compliance with client, program and NEPA requirements.
- Completeness of preliminary design and support documents.
- Spot checks for interdisciplinary coordination.

The following paragraphs discuss specific factors will help determine the appropriate scope and level of review.

The study area is highly urbanized (approximately 90 percent). Wildlife habitat is limited within the watershed because of the urbanized nature of the surrounding area. An Environmental Assessment will be developed for NEPA due to the long history of environmental analyses that have been performed in the area.

Project risks are believed to be relatively low since the public has been coordinated with throughout the study process, components are not prone to structural failure, there is no new science involved in the project, and all predictions of outcomes have a low level of uncertainty. As in any large flood control project, there is moderate long-term risk to population and assets which reside or may relocate into areas protected by structural flood

control improvements. Current estimate of construction is approximately $200 to $250 million.

Other factors considered affecting the scope and level of review:

- The project involves no new science, incorporates ongoing public involvement, and follows an established institutional process. Consequently, the project is not expected to encounter any technical, institutional, or social challenges.
- Human life is not commonly lost due to flooding in Harris County. Flooding-related deaths in the county typically involve human error with vehicles, either by crashing into bayous or by driving into water deep enough to drown a vehicle. Rare instances of indirect deaths by electrocution or lack of access for emergency vehicles have also been reported. Given this history, the risk of flooding-related deaths in the study area is considered to be low. Project implementation is expected to further reduce the frequency and magnitude of flooding risk.
- It is not expected that risk to human life would substantially increase if the project fails to perform (in the form of overbank flooding). In the study area, warning time of impending inundation is generally in the range of 1 to 3 hours from the start of rainfall, and flooding durations of 3 to 5 hours are likely. Floodwater velocities in floodplain areas range from 0.1 to 0.5 feet per second and are not hazardous.
- The Governor of Texas is not requesting a peer review by independent experts.
- The project is not expected to cause significant public dispute with regard to its size, nature, or effects. The proposed widening and deepening of White Oak Bayou does not involve buyout of adjacent properties, nor will it significantly alter the landscape of the existing channel. Detention is a common practice within Harris County and is proposed on unoccupied land where practicable.
- The project is not expected to cause significant public dispute with regard to its economic or environmental costs and benefits.
- The project design will not involve precedent-setting methods, use innovative materials, or change prevailing practices.
- Pursuant to Section 211(f) of WRDA 1996, the Local Sponsor has taken the lead in constructing a number of project components. To the extent that funding is available, overlapping construction may occur among the many components which comprise the Recommended Plan. With the Local Sponsor assuming the risk of expending these funds, the level of uncertainty associated with the estimates of construction costs for many elements of the project are significantly reduced.

d. In-Kind Contributions. The on-going feasibility study is being performed under Section 211(f) of the Water Resources Development Act of 1996, as amended by WRDA 2007. Section 211(f) gives a non-Federal interest the opportunity to take the lead in the planning, design, and construction for a flood control project in cooperation with the Corps. The local sponsor, Harris County Flood Control District (HCFCD), is assessing the feasibility of flood damage reduction for White Oak Bayou, within Harris County Texas. The HCFCD expects to recover a portion of the study costs from USACE.

4. 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 White Oak Bayou Federal Flood Control Project Study Project Management Plan (PMP). It is managed by the Galveston 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 (QMP) providing for seamless review, quality checks and reviews, supervisory reviews, PDT reviews, etc. The non-Federal sponsor is putting together the study documents. Additionally, the PDT is responsible for a complete review of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander. For the White Oak Bayou Federal Flood Control Project Study, non-PDT members and/or supervisory staff will conduct this review for major draft and final products, including products provided by the non-Federal sponsors as in-kind services following review of those products by the PDT. It is expected that the Major Subordinate Command (MSC)/District QMP addresses the conduct and documentation of this fundamental level of review. A Quality Control Plan (QCP) is included in the PMP for this study and addresses DQC, which is required for this study. Documentation of DQC in the form of a written certification will be provided to the ATR team as part of the review process. DQC is not addressed further in the Review Plan.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is a mandatory 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 a 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 will review 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. EC 1165-2-214 requires that DrChecks (https://www.projnet.org/projnet/) be used to document all ATR comments, responses, and associated resolution accomplished. This RP outlines the planned approach for meeting this requirement for the White Oak Bayou Federal Flood Control Project Study. The status of ATR can be found in Section 10 of this document.

a. Products to Undergo ATR. The following products will be reviewed:

- Without Project Conditions
- Component Identification and Screening
- General Reevaluation Report
- NEPA Document
- Engineering Appendix
- Cost Analysis

b. Required ATR Team Expertise. The following tasks will be performed during the ATR:

1. Team Leader and one to two team members will meet with District staff and local sponsor and their contractor to review project and discuss major assumptions, analyses, and calculations.

2. Team Leader and one to two members will attend one Federal Studies Coordination Team (FSCT) meeting at District. FSCT was developed for Section 211(f) projects being evaluated during feasibility analysis and made up of a multi-disciplinary group. This group includes members from all disciplines within the District, a representative of the project sponsor, and others, as necessary. It is the goal of this team to ensure expedient and open communication between all team members and disciplines to ensure timely completion of the study. The PCX representative will attend one FSCT meeting to discuss major assumptions, analyses, and calculations to avoid significant comments later that could adversely affect project schedules and costs. Subsequent attendance of FSCT meetings can be by teleconference.

3. Review FSCT meeting notes in regard to White Oak Bayou. FSCT meeting notes will be provided electronically on a quarterly basis. Review the notes and provide comments citing appropriate Corps of Engineers regulations for issues that are not in compliance with established Corps policies and regulations. Identify any other potential errors, omissions, or issues of a technical or policy nature.

4. Conduct ATR for the Without Project Conditions and for the draft General Reevaluation Report (GRR) for the Alternative Formulation Briefing (AFB). Perform a review of the read-ahead information. Provide written comments citing appropriate USACE regulations for issues that are not in compliance with established policies and regulations. Identify any other potential errors, omissions, or issues of a technical or policy nature.

District will be responsible for all legal reviews of GRR.

The ATR is best conducted by experienced peers within the same discipline who are not directly involved with the development of the study or project being reviewed. Management of ATR reviews are conducted by professionals outside of the home district. For planning feasibility-level studies, the ATR is 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 Flood Risk Management PCX is responsible for identifying the ATR team members. The Galveston District could suggest possible reviewers. The ATR team members will reside outside the Galveston District with the ATR team leader from outside the Southwestern Division. The ATR team has been identified and the names and disciplines of the ATR team will be included in Appendix A of this document.

It is anticipated that the review team will consist of nine reviewers, one from each of the following disciplines: engineering design, hydraulics and hydrology, economics,

environmental, real estate, plan formulation, operations and cost engineering. A brief description of the disciplines required for the ATR team are identified below:

a. Engineering Design – the reviewer(s) should have extensive knowledge of channel design for flood damage reduction studies

b. Hydraulics and Hydrology – the reviewer(s) should have extensive knowledge of hydrology and hydraulics, and streambank erosion models/studies.

c. Economics – the reviewer should have a strong understanding of economic models or studies relative to flood damage reduction analyses.

d. Environmental – the reviewer(s) should have strong background in coastal ecosystems and Texas environmental laws and regulations. Reviewer(s) should also have a strong knowledge of ecosystem restoration.

e. Real Estate – the reviewer should have knowledge in reviewing RE Plans for feasibility studies.

f. Plan Formulation – the reviewer(s) should have a strong knowledge in current planning policies and guidance related to feasibility studies.

g. Geotechnical – the reviewer(s) should have a strong knowledge of geotechnical and stream bank erosion.

h. Cost Engineering – the reviewer should have a strong knowledge of the cost estimating practices for flood damage reduction projects.

i. Cultural Resources – the reviewer(s) should have a strong knowledge of archeology and historic preservation.

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 1110-2-12 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)

Per EC 1165-2-214, Independent External Peer Review is required for projects which will have public safety concerns, a high level of complexity, novel or precedent-setting approaches, are controversial, have significant interagency interest, have a total cost greater than $45 million, have significant economic, environmental and social effects to the nation, or requested by the Governor of an affected state.

a. Decision on IEPR. It is anticipated that an IEPR be conducted based on the scale of costs and benefits for the project. The scope of the IEPR review, conducted by a qualified team

outside of USACE, will address all the underlying planning, engineering, economics and environmental analyses performed. DrChecks (https://www.projnet.org/projnet/) will also be used to document all IEPR comments, responses, and associated resolution accomplished.

b. Products to Undergo Type I IEPR. The draft General Reevaluation Report (dGRR) and draft Environmental Assessment (dEA) underwent Type I IEPR between September 2010 and January 2011. The March 2011 Alternative Formulation Briefing (AFB) resulted in no major changes to the project, thus it is assumed that a second IEPR will not be required. If a second IEPR is required, the following guidelines will apply.

c. Required Type I IEPR Panel Expertise. It is anticipated that the review team will consist of five reviewers, one from each of the following key disciplines: hydraulics and hydrology, economics, environmental, plan formulation, and cost engineering. A brief description of the disciplines required for the IEPR team are identified below:

a. Hydraulics and Hydrology – the reviewer(s) should have extensive knowledge of hydrology and hydraulics, and streambank erosion models/studies.

b. Economics – the reviewer(s) should have a strong understanding of economic models or studies relative to flood damage reduction analyses.

c. Environmental – the reviewer(s) should have strong background in coastal ecosystems and Texas environmental laws and regulations. Reviewer(s) should also have a strong knowledge of ecosystem restoration.

d. Plan Formulation – the reviewer(s) should have a strong knowledge in current planning policies and guidance related to feasibility studies.

e. Cost Engineering – the reviewer(s) should have a strong knowledge of the cost estimating practices for flood damage reduction projects.

d. Documentation of Type I IEPR. The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, 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. Planning models could include, but are not limited to: economic damage models (e.g., HEC-FDA, Beach FX, IMPLAN), environmental models for habitat evaluation or mitigation planning (e.g., IWRPlan, HEP HSI models, HGM), transportation or navigation models, and homegrown or spreadsheet models (e.g., excel spreadsheets, @Risk, etc; see EC 1105-2-412 for more information about what constitutes a planning model). Below are some examples of the type of information that might be included in this section (Note: Lesser known models, including local/regional models, will need a more complete description than widely used, nationally recognized models).

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 (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 along White Oak Bayou to aid in the selection of a recommended plan to manage flood risk.	Certified
HEP/HSI Models (Habitat Evaluation Procedure / Habitat Suitability Indices)*	USFWS HEP evaluates the quality and quantity of available habitat for selected wildlife species. The HEP delivers Habitat Suitability Indices (HSI), which measure habitat suitability of a sample plot relative to optimum habitat suitability for a species in a defined region.	Approved

*HSI models used for the HEP analysis are referenced below.

Allen, Arthur W. 1987 Revised. Habitat Suitability Index Model: Eastern Gray Squirrel. National Ecology Center, U.S. Fish and Wildlife Service, Fort Collins, CO.

Allen, Arthur W. 1987. Habitat Suitability Index Model: Barred Owl. National Ecology Center, U.S. Fish and Wildlife Service, Fort Collins, CO.

Allen, Arthur W. 1985. Habitat Suitability Index Model: Swamp Rabbit. Habitat Evaluation Procedure Group, U.S. Fish and Wildlife Service, Fort Collins, CO.

Cade, Brian S. 1985. Habitat Suitability Index Model: American Woodcock (Wintering). Habitat Evaluation Procedure Group, U.S. Fish and Wildlife Service, Fort Collins, CO.

Chapman, Brian R., and Rebecca J. Howard. 1984. Habitat Suitability Index Model: Great Egret. National Coastal Ecosystems Team, U.S. Fish and Wildlife Service, Washington, D.C.

Schroeder, Richard. 1982. Habitat Suitability Index Model: Yellow Warbler. U.S. Fish and Wildlife Service, Fort Collins, CO.

Schroeder, Richard. 1983. Habitat Suitability Index Model: Downy Woodpecker. U.S. Fish and Wildlife Service, Fort Collins, CO.

b. Engineering Models. Engineering models could include, but are not limited to: hydrologic, hydraulic, geotechnical, civil, structural, cost engineering and similar models. Below is an example of the type of information that might be included in this section (Note: Lesser known models will need a more complete description than widely used, nationally recognized models).

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-HMS 2.2.2 (Hydrologic Modeling System)	The Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) is designed to simulate the precipitation-runoff processes of dendritic watershed systems. The program will be used to evaluate runoff from the White Oak Bayou watershed to aid in the selection of a recommended plan to manage flood risk.	Community of Practice (CoP) Preferred Model
HEC-RAS 3.1.1 (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) is designed to perform one-dimensional hydraulic calculations along a single watercourse or a system of channels. The program will be used to perform an unsteady state analysis for main stem routing and detention calculations and a steady state analysis to compute water surface profile elevations along White Oak Bayou.	CoP Preferred Model
TRACES MII 4.1 (Tri-Service Automated Cost Engineering Systems)	TRACES is an integrated suite of cost engineering tools designed to support the cost engineers throughout the USACE, Air Force, and Navy. MCACES (Micro-Computer Aided Cost Estimating System) MII is a second generation module of TRACES used by the USACE for the preparation of detailed construction cost estimates. MCACES MII will be used to evaluate capital costs for the White Oak Bayou Recommended Plan.	CoP Preferred Model

8. 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 home MSC Commander. 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. A Civil Works Review Board is not anticipated for the project.

9. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering DX, located in the Walla Walla District. The DX will assist in determining the expertise needed on the ATR team and Type I IEPR team (if required) and in the development of the review charge(s). The DX will also provide the Cost Engineering DX certification. The RMO is responsible for coordination with the Cost Engineering DX.

10. REVIEW SCHEDULE AND COSTS

a. ATR Schedule and Cost

Review Schedule

TASK	Completion or Proposed Date
ATR for Alternative Formulation Briefing (AFB)	Aug 2010
ATR Post-AFB Backcheck	Aug 2012
ATR review of revised draft documents (before FPR)	Sep 2012
ATR Certification Draft Report	Sep 2012
Public Review of Draft Report	Jun 2013
ATR Certification Final Report	

The cost for ATR for the Without Project Conditions is approximately $20,000. It is estimated that the ATR of the remainder of the study will be $50,000.

b. Type I IEPR Schedule and Cost.

Independent External Peer Review was performed between October 2010 and April 2011. The cost for IEPR was approximately $150,000.

c. Model Certification/Approval Schedule and Cost. All models anticipated to be used are already certified or approved.

11. PUBLIC PARTICIPATION

Public involvement program has been established. Stakeholders Group meetings are held basically on a quarterly basis. Public Information meetings are held periodically. Stakeholder and public comments are continually solicited. Public involvement section will be part of Report and EA and provided to ATR and IEPR reviewers.

12. 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. 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.

13. REVIEW PLAN POINT OF CONTACT

Public questions and/or comments about this Review Plan may be directed to the following points of contact:

- Mr. Robert Van Hook, Galveston District PDT Planning contact at (409) 766-3024 or robert.c.vanhook@usace.army.mil;
- Mr. Wayne Crull HCFCD at (713) 684-4087 or wayne.crull@hcfcd.org
- Mr. Eric Thaut, FRM-PCX Manager at 415.503.6852 or eric.thaut@usace.army.mil.

ATTACHMENT 1: TEAM ROSTERS

PROJECT DELIVERY TEAM

NAME	Discipline/ORG.	PHONE	EMAIL
	Project Manager CESWG-PM-J		
	Planning Study Lead CESWG-PE-PL		
	Civil Engineer CESWG-EC-EG		
	Civil Engineer CESWG-EC-EH		
	Economist CESWG-PE-PL		
	Environmental Lead CESWG-PE-PR		
	Realty Specialist CESWG-RE-A		
	Cost Engineer CESWG-EC-PS		
	Archeologist CESWG-PE-PR		
	Public Affair Officer CESWG-PAO		

LOCAL SPONSOR PROJECT DELIVERY TEAM

NAME	TITLE/ORG.	PHONE	EMAIL
	Senior Study Manager		
	Assistant Study Manager		

DCQ TEAM ROSTER

NAME	TITLE/ORG.	PHONE	EMAIL
	DQC Manager		
	Plan Formulation		
	Economics		
	Environmental/NEPA		
	Real Estate Review		
	Engineering		

AGENCY TECHNICAL REVIEW TEAM

NAME	**TITLE/ORG.**	**PHONE**	**EMAIL**
	ATR Manager		
	Plan Formulation		
	Economics		
	Environmental/NEPA		
	Cultural Resources		
	Real Estate Review		
	Hydraulics & Hydrology		
	Geotechnical		
	DX Cost Engineering		

VERTICAL TEAM

NAME	**TITLE/ORG.**	**PHONE**	**EMAIL**
	MSC Planning Coordinator for SWG		
	Chief of Planning Division		
	Regional Integration Team		

INDEPENDENT EXTERNAL PEER REVIEW PANEL

NAME	TITLE/ORG.	PHONE	EMAIL
	Senior Study Manager		
	Assistant Study Manager		
	Battelle		

PLANNING CENTER OF EXPERTISE
FLOOD DAMAGE REDUCTION

NAME	TITLE/ORG.	PHONE	EMAIL
	Program Manager, PCX Flood Risk Management		

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECSION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Draft General Reevaluation Report and Environmental Assessment for the White Oak Bayou Flood Control Project, Harris County, Texas. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. 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[sm].

SIGNATURE _____ _____

Name Date
ATR Team Leader
CELRH-PM-PD-F

SIGNATURE _____ _____

Name Date
HCFCD Project Manager

SIGNATURE _____ _____

Name Date
Review Management Office Representative
CESPD-PDS-P

CERTIFICATION OF AGENCY TECHNICAL REVIEW

The Harris County Flood Control District has completed the Final Draft White Oak Bayou Flood Control Project, Section 211(f) Report – Harris County, Texas. An independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. No significant concerns were identified during the review of the final draft report. The report and all associated documents required by the National Environmental Policy Act have been fully reviewed.

SIGNATURE _____ _____

Name Date
Senior Project Manager
Harris County Flood Control District

SIGNATURE _____ _____

Name Date
Planning Department Manager
Harris County Flood Control District

SIGNATURE _____ _____

Name Date
Chief Engineer
Harris County Flood Control District

SIGNATURE _____ _____

Name Date
Director
Harris County Flood Control District

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: 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/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
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	RMC	Risk Management Center
IEPR	Independent External Peer Review	RMO	Review Management Organization
ITR	Independent Technical Review	RTS	Regional Technical Specialist
LRR	Limited Reevaluation Report	SAR	Safety Assurance Review
MSC	Major Subordinate Command	USACE	U.S. Army Corps of Engineers
		WRDA	Water Resources Development Act