

REVIEW PLAN

**HUNTING 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
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**US Army Corps
of Engineers ®**

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1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan (RP) defines the scope and level of peer review for the Hunting Bayou Federal Flood Control Project, Harris County, Texas.

b. References

- (1) Engineering Circular (EC) 1165-2-214, Civil Works Review, 15 Dec 2012
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 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

c. **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). EC 1165-2-214 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 1165-2-214) 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.** The decision document will include the Hunting Bayou Federal Flood Control Project, Harris County, Texas – General Revaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) and its supporting appendices, i.e. Hydrology and Hydraulics, Engineering Analysis, Cost Estimates, Economic Analysis, and Real Estate Plan. 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 by the Chief of Engineers and Congressional authorization. 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 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 approval level for the report is the Assistant Secretary of the Army for Civil Works ASA (CW).

- b. Study/Project Description.** The study area is located in Harris County, Texas. The study area includes the main channel of Hunting Bayou, Texas, extending approximately 15 miles from its headwaters west of United States (US) Highway 59 to its confluence with the Houston Ship Channel. The total area of the Hunting Bayou watershed covers approximately 30 square miles. The upstream two-thirds of the watershed are within the City of Houston, the fourth most populous city in the United States. The downstream portions of the watershed, primarily below Interstate Highway (IH) 10, are located within the Cities of Galena Park and Jacinto City. The Hunting Bayou watershed is highly developed as mixed residential, commercial, and industrial land use.

The on-going feasibility study is being performed under Section 211(f) of the Water Resources Development Act of 1996. Section 211(f) gives a non-Federal interest the opportunity to take the lead in the planning and design 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 risk management (FRM) for Hunting Bayou, within Harris County Texas. The Houston/Harris County area is about 50 miles northwest of Galveston, Texas, on the mid to upper Texas coast.

A reconnaissance-level study was undertaken to determine whether FRM benefits produced by FRM improvements along Hunting Bayou are sufficient to offset the costs and environmental consequences of the improvements. The primary improvements considered in this study included grass-lined earthen channels and offline detention basins. Other considerations included an inline detention basin near the upstream reach, levees, bypass channels, and non-structural alternatives such as buyouts and floodproofing. The Expedited Reconnaissance Study Report, Harris County Flood Control District, (April 2006), concluded that there is sufficient Federal interest in FRM improvements to conduct more detailed, feasibility-level studies. During feasibility study efforts, close coordination is being maintained with resource agencies, interested parties, and local interests. Future periodic public meetings will be scheduled similar to the National Environmental Policy Act (NEPA) scoping meetings held in November 2007. Current construction cost estimates of the National Economic Development (NED) plan range between \$150-200 million, however at this time no mitigation analysis of downstream hydraulic and damage impacts has taken place.

- c. Factors Affecting the Scope and Level of Review.** Pursuant to EC 1105-2-214, all decision documents and their supporting analyses will undergo District Quality Control (DQC) and Agency Technical Review (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. For the Hunting Bayou documents, Quality Control reviews will be completed by the local sponsor and the Galveston District will complete Quality Assurance reviews. This includes decision documents prepared by sponsors under Section 211 of

WRDA 96. ATR and Type I IEPR shall be performed in full adherence to EC 1105-2-214. The draft GRR will need to have a review team assigned by the Planning Center of Expertise (PCX) for Flood Risk Management Projects for the performance of ATR (Agency Technical Review). It is further anticipated that a Type I IEPR will be conducted based on the scale of costs and benefits for the project. The study will address human life/safety issues and the HCFCD has determined that the proposed project does not pose a significant threat to human life. A letter from the HCFCD to SWG and SWG's acknowledgment of the assessment via 2012 DEC 12 meeting notes are attached to this Review Plan.

Within the HCFCD area of responsibility, human life is rarely lost in the study area due to flooding. Therefore the Hunting Bayou watershed is considered to have a low level of loss-of-life risk due to flooding. The population at risk includes residential neighborhoods, industrial facilities, and a nearby railroad yard. There are no dams or levees in the project study that could lead to structural failures along the channel mainstem during a flood event. Channel bank slope failures might occur during a major storm event, but the potential for bank slope failures also applies to Without Project Conditions. In regard to the proposed offline detention basin, it is possible debris might clog the offline detention basin outlet, causing the basin to exceed capacity and overtop.

Typical loss-of-life due to flooding incidences occurs when motorists choose to ignore warning signs or messages and drive into high flood water conditions, or due to vehicular accidents occurring at or near ditches. Overall, flood waters within the Hunting Bayou watershed rise gradually (no flash flooding conditions) due to its relatively wide and flat floodplain. Project implementation is expected to lower the frequency and magnitude of risk associated with flooding. It is not expected that this risk would increase if the proposed NED project fails to perform. However, should the project fail to perform, flooding could occur by way of water levels gradually exceeding the channel overbanks (no massive flood waves). Hydrologic and Hydraulic analysis shows that there is typically a few hours of lag time after peak rainfall occurs before peak stage begins to occur at the project study, providing some warning time to those in affected areas. Lastly, the project involves no new science and will utilize construction practices that are very common in Harris County, Texas. The project is not expected to encounter any significant technical or construction challenges.

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
- Compliance with client, program and NEPA requirements.
- Completeness of preliminary analysis and support documents.
- Spot checks for interdisciplinary coordination.

The Hunting Bayou watershed is highly urbanized with few natural plant communities remaining. Small areas of prairie have been identified in undeveloped areas away from the channel. Significant riparian forests exist through Herman Brown Park and south of Federal Road. Wildlife habitat is limited within the watershed because of the heavy urbanization and the relatively low quality of the water in the bayou. The U.S. Fish and Wildlife Service (USFWS) has indicated that no threatened or endangered species under its jurisdiction are likely to occur within the study area (USFWS 1998). The State Historic Preservation Officer (SHPO) has confirmed that some archaeological sites have

been documented in the general vicinity along Hunting Bayou and may be eligible for inclusion in the National Register of Historic Places (NRHP).

Project risks are believed to be relatively low since the public has been coordinated with throughout the study process starting in 1998 through 2007, potential for project failure is small, 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.

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.
 - It is not anticipated there will be a request by the Governor for a peer review to be conducted by independent experts.
 - The project is likely to experience vocal opposition from the local few being displaced due to channel widening included as part of the NED plan.
 - The project is not anticipated to receive significant public dispute based on environmental disturbances since the project area is already well urbanized. Consequently, because Hunting Bayou is well urbanized, vocal opposition may use this as a reason not to proceed with project. However, it is not anticipated that a vast majority of the public will dispute the benefit of the project.
 - 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.
 - The project design will not involve precedent-setting methods, use innovative materials, or change prevailing practices. One unique aspect of project is to build the detention basin before channel widening construction, so as not to flood downstream structures. Channel stability design will be implemented.
- 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 Hunting Bayou, within Harris County Texas. The HCFCD expects to recover a portion of the study costs from USACE.

4. DISTRICT QUALITY CONTROL (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). Quality Control will be completed by the local sponsor. SWG will complete Quality Assurance

reviews. Documentation of DQC activities is required and should be in accordance with the local sponsor's quality management system. DrChecks will be used to document all Quality Assurance comments, responses, and associated resolution accomplished.

- a. Documentation of DQC.** The non-Federal sponsor is putting together the study documents. DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Hunting Bayou Federal Flood Control Project Study PMP. As directed by SWG, Quality Control will be managed by the local sponsor since the local sponsor is preparing the GRR and SEIS documentation. The Galveston District will complete Quality Assurance documentation on the GRR and SEIS submitted by the local sponsor. In addition, basic quality control tools include a Quality Management Plan (QMP) providing for seamless review, quality checks and reviews, supervisory reviews, PDT reviews, etc. 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 Hunting 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. DQC is not addressed further in the Review Plan.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR (which replaces the level of review formerly known as Independent Technical Review [ITR]) 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 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 the designated 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. The ATR team lead will be from outside the home MSC. ATR team members shall be from the Community of Practice (CoP) certified list of reviewers.

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

- Preliminary Risk and Uncertainty Analysis (completed Spring 2012)
- Preliminary Draft General Reevaluation Report (GRR) with draft Supplemental Environmental Impact Statement (SEIS)
- Draft GRR with draft SEIS
- Final GRR with SEIS

- 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 insure expedient and open communication between all team members and disciplines to insure 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 Hunting 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 (completed) and for the draft General Reevaluation Report (GRR) for the Alternative Formulation Briefing (AFB), schedule to be determined. 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.

An ATR for the preliminary risk and uncertainty analysis was conducted in March and April 2012. The HEC-HMS, HEC-RAS, and HEC-FDA models associated with the study were reviewed for technical adequacy and application. Comments were addressed and closed on June 29, 2012 and certified on August 3, 2012. The risk and uncertainty analysis will be revisited during the ATR of the GRR/SEIS documents prior to the AFB.

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 seven reviewers, one from each of the following disciplines: Plan Formulation, Environmental Compliance, Hydrology and Hydraulics, Engineering, Cost Engineering, Economics, and Real Estate. A brief description of the disciplines required for the ATR team are identified below:

a. Plan Formulation – the reviewer(s) should have a firm understanding of plan formulation content requirements necessary for ATR and a general understanding the technical details supported by the supplemental appendices.

b. Environmental Compliance – the reviewer(s) should have extensive knowledge of environmental impacts and consequences. The reviewers should have a strong background in NEPA compliance documents, particularly Environmental Impact Statements.

c. Hydrology & Hydraulics – the reviewer(s) should have extensive knowledge of hydrology and hydraulics.

d. Engineering – the reviewer(s) should be knowledgeable in areas related, but not limited to earthwork, construction management, and common constructability issues related to civil works projects.

e. Cost Engineering – the reviewer(s) should be experienced with, but not limited to, cost estimating practices associated with facility and equipment mobilization, earthwork, structural and utility modifications or replacements, and the use of U.S. Army Corps of Engineers' Micro Computer Aided Cost Engineering System (MCACES)

f. Economics – the reviewer(s) should have a strong understanding of economic models or studies relative to flood damage reduction analyses. Reviewer(s) should also be familiar with risk-based analysis for flood damage reduction studies and how risk and uncertainty factors are incorporated in both hydraulic and economic inputs.

g. Real Estate – the reviewers should familiar with the real estate requirements necessary for construction, operation, and maintenance of the reformulated plan.

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 been properly followed;
- (3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
- (4) The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in 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)

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. There are two types of IEPR:

- **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 biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all 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 1165-2-214.

- 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.

Decision on IEPR. It is anticipated that a Type I IEPR be conducted based on the scale of costs and benefits for the project. Therefore, per EC 1165-2-214, it is determined that the project plan falls under Type I IEPR since the total project cost estimate of \$150-\$200 Million is greater than the \$45 million cost trigger. This includes cost of construction, rights of way, relocations, and disposal areas. A SAR will not be included with the Type I IEPR based on the assessment that the project does not pose a significant threat to human life (see attached letter from HCFCD and SWG acknowledgement). Per EC 1165-2-214, a Type II IEPR will not be conducted on design and construction activities associated with this project because the implementation of the project does not pose a significant threat to human life (public safety).

The scope of the Type I IEPR review, conducted by a qualified team outside of USACE, will address all the underlying hydrologic and hydraulic analyses, economic analysis, and risk and uncertainty analysis performed. DrChecks (<https://www.projnet.org/projnet/>) will also be used to document all IEPR comments, responses, and associated resolution accomplished.

- a. Products to Undergo Type I IEPR.** The draft GRR with draft SEIS will undergo Type I IEPR.
- b. 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, and risk and uncertainty. A brief description of the disciplines required for the IEPR team are identified below:
 - a. Plan Formulation** – the reviewer(s) should have a strong knowledge in current planning policies and guidance related to feasibility studies.
 - b. Economics** – the reviewer(s) should have a strong understanding of the HEC-FDA economic model and studies relative to flood damage reduction analyses as well as applications of risk and uncertainty methods and how they relate to hydrologic and hydraulic modeling and flood damage analyses.
 - c. Environmental** – the reviewer(s) should have strong background in coastal ecosystems and Texas environmental laws and regulations. The reviewers should have a strong background in NEPA compliance documents, particularly Environmental Impact Statements.

d. Civil Engineering – the reviewer(s) should be knowledgeable in areas related, but not limited to, utility adjustments, excavation, fill, and disposal practices, construction scheduling, and common constructability issues related to civil works projects.

e. Hydraulics and Hydrology – the reviewer(s) should have extensive knowledge of hydrology and hydraulics, the HEC-HMS and HEC-RAS modeling software packages, use of unsteady flow simulations in HEC-RAS, local Harris County hydrologic and hydraulic methodologies, and Harris County Flood Control District policies and criteria.

c. 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. 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.

8. 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.

9. MODEL CERTIFICATION AND 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 (if required).

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. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. 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 (if required).

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 along Hunting Bayou to aid in the selection of a recommended plan to manage flood risk.	Certified
HEP/ HSI Models for Swamp Rabbit, Mink, Barred Owl, and Snapping Turtle (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.	Certified

b. Engineering Models. The following engineering 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	Approval Status
HEC-HMS 3.4.0 (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 Hunting Bayou watershed to aid in the selection of a recommended plan to manage flood risk.	Community of Practice (CoP) Preferred Model
HEC-RAS 4.0.0(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 Hunting 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 Hunting Bayou Recommended Plan.	CoP Preferred Model

Since the study is utilizing only certified models, a model review plan is not required.

10. REVIEW SCHEDULES AND COSTS

a. ATR Schedule and Cost

<u>TASK</u>	<u>Review Schedule</u>	<u>Completion or Proposed Start Date</u>
Preliminary Risk and Uncertainty Analysis ATR (Complete)		August 2012
District Quality Control		March 11, 2013
ATR of Draft GRR and SEIS (before AFB)		April 1, 2013
ATR Certification Draft Report		June 12, 2013
ATR Backcheck Final GRR and SEIS		September 19, 2013
ATR Certification of Final Report		November 11, 2013
Public Review of Draft Report		February 18, 2014
ATR of Final GRR and SEIS		May 20, 2014
ATR Certification of Final Report		June 12, 2014

The cost for ATR for the preliminary draft GRR and draft SEIS is approximately \$60,000. It is estimated that the two other ATRs of the study will be an additional \$60,000.

b. Type I IEPR Schedule and Cost.

Independent External Peer Review will be performed in early 2013. The cost for IEPR will be approximately \$150,000.

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

11. PUBLIC PARTICIPATION

Pursuant to Section 211 of WRDA 1996, the Local Sponsor has led the public involvement effort supporting this GRR throughout the planning process. These efforts were coordinated with USACE-SWG and were conducted in accordance with ER 1105-2-100 and ER 200-2-2. The public within the watershed has been engaged through a series of public meetings held during the course of the study. The meetings were held to gain input from the local community regarding the flood damage reduction plan for Hunting Bayou. The meetings were held from the start of this study in 1998 through 2007. Additionally, HCFCD has provided study status and information as the recommended project became defined at meetings for various community organizations from 2006 to 2008.

A public hearing will be scheduled during the 45-day public review period on Draft GRR/SEIS. Significant comments will be made available to the ATR team to assist in their final review before the Final GRR/SEIS is prepared.

The final decision documents will be made available to the public via the local sponsor's and SWG's websites.

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 POINTS OF CONTACT

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

- Galveston District PDT Planning contact at (409) 766-3024
- HCFCD Assistant Director at (713) 684-4269
- HCFCD Study Manager at (713) 684-4167
- FRM-PCX Manager at 415.503.6852

ATTACHMENT 1: TEAM ROSTERS

SWG 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		
	Chief, Environmental Section CESWG-PE-PR		
	Super, Realty Specialist CESWG-RE-A		
	Cost Engineer CESWG-EC-EC		
	Archeologist CESWG-PE-PR		
	Public Affair Officer CESWG-PAO		

LOCAL SPONSOR PROJECT DELIVERY TEAM

NAME	TITLE/ORG.	PHONE	EMAIL
	Assistant Director/ HCFCFCD		
	Study Manager/HCFCFCD		
	Sr. Study Manager/HCFCFCD		
	Account Administration/HCFCFCD		
	Consultant Study Manager/ AECOM		

DISTRICT QUALITY ASSURANCE (DQC) TEAM (SWG)

NAME	Discipline/ORG.	PHONE	EMAIL
	Planning DQC		
	Economics DQC		
	Environmental DQC		
	H&H DQC		
	Cost DQC		
	Real Estate DQC		
	Engineering DQC		

LOCAL SPONSOR QUALITY CONTROL TEAM

NAME	Discipline/ORG.	PHONE	EMAIL
	Planning DQC/ AECOM		
	Economics DQC/ AECOM		
	Environmental DQC/ AECOM		
	H&H DQC/ AECOM		
	Cost DQC/ AECOM		
	Real Estate DQC/ AECOM		
	Engineering/AECOM		

AGENCY TECHNICAL REVIEW TEAM

NAME	Discipline/ORG.	PHONE	EMAIL
	ATR Lead and Planning, USACE St. Louis		
	General Engineering		
	Hydraulics & Hydrology		
	Economics and Risk and Uncertainty		
	Environmental/NEPA		
	Real Estate/Lands		
	Geotechnical		
	DX Cost Engineering		
	Cultural		

INDEPENDENT EXTERNAL PEER REVIEW PANEL

NAME	TITLE/ORG.	PHONE	EMAIL
TBD	TBD	TBD	TBD

VERTICAL TEAM ROSTER POINTS OF CONTACT

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

**PLANNING CENTER OF EXPERTISE
FLOOD DAMAGE REDUCTION**

NAME	TITLE/ORG.	PHONE	EMAIL
	Deputy Director, PCX Flood Risk Management		
	XX, PCX Cost Engineering		

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed on the analyses and methodologies contained in the Draft *Hydrologic and Hydraulic Appendix* and *Economics Appendix* for the Hunting Bayou Federal 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 DrCheckssm.

SIGNATURE

ATR Team Leader
CEMVP-PD-F

Date

SIGNATURE

Harris County Flood Control District Authorized
Representative for Hunting Bayou
Assistant Director and Director of Engineering and
Construction

Date

SIGNATURE

Project Manager
CESWG-PM-J

Date

SIGNATURE

Review Management Office Representative
CESPD-PDS-P

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

The Harris County Flood Control District has completed a major draft report of the Hunting 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

Alan J. Potok, P.E.
Harris County Flood Control District Authorized
Representative for Hunting Bayou
Assistant Director and Director of Engineering and
Construction

Date

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