

Final Independent External Peer Review (IEPR) Report for the Follow-up IEPR of the Clear Creek, Texas Flood Risk Management Project Revised Draft General Reevaluation Report and Preliminary Draft Environmental Impact Statement

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management Planning Center of Expertise
Sacramento District

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July 23, 2010



SHORT-TERM ANALYSIS SERVICE (STAS)

on

**Final Independent External Peer Review Report
Follow-up IEPR of the
Clear Creek, Texas
Flood Risk Management Project
Revised Draft General Reevaluation Report and
Preliminary Draft Environmental
Impact Statement**

by

**Battelle
505 King Avenue
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for

**Department of the Army
U.S. Army Corps of Engineers
Flood Risk Management Planning Center of Expertise
Sacramento District**

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Scientific Services Program

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FINAL
INDEPENDENT EXTERNAL PEER REVIEW REPORT
for the
Follow-up IEPR of the
Clear Creek, Texas
Flood Risk Management Project
Revised Draft General Reevaluation Report and
Preliminary Draft Environmental Impact Statement

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (USACE) has been directed by Congress to develop the Clear Creek General Reevaluation Report (GRR). Clear Creek drains an area south of and partially within the city of Houston, Texas. The Clear Creek watershed is located in four counties, includes 16 cities, and covers approximately 260 square miles of land. The watershed is composed of relatively flat coastal plain with elevations varying from near sea level at Clear Lake on the eastern edge of the watershed to about 75 feet above mean sea level (MSL) on the western watershed boundary. Clear Creek receives flow from 17 principal tributaries. The Clear Creek watershed 1 percent (100-year) annual exceedance probability (AEP) floodplain contains an area of approximately 19,000 acres. Many communities and subdivisions along the creek are subject to flooding, and recent floods (1973, 1976, twice in 1979, 1989, October 1994, and June 2001) have caused extensive property damage.

The Flood Control Act of 1962 authorized the initial investigation of flood problems on Clear Creek. In 1968 Congress authorized the Clear Creek Flood Control Project, which consisted of an improved grass-lined channel 31 miles long that would replace about 41 miles of existing winding channel. This channel was designed to contain flood flows up to and including the 1 percent (100-year) AEP flood event. Subsequent Congressional actions, administrative changes to water resources planning policies, changes in the project area, and changes in the attitude of the affected public, required a comprehensive restudy of the Clear Creek project.

A restudy was initiated in the early 1970s. In 1982 a modified project was recommended that changed the previous 1 percent (100-year) AEP flood event level of protection in the 1968 authorization to a 10 percent (10-year) AEP flood event level. The new plan required less channel modification and included nonstructural measures. Construction began in the mid-1990s. Subsequently, public concerns about potential environmental and hydraulic impacts led the project sponsors to request that construction be suspended. The Harris County Flood Control District developed a Sponsor Proposed Alternative (SPA) that is substantially different from the authorized project. Therefore, Galveston District initiated a general reevaluation study in 1999 to determine a technically effective and publicly acceptable solution to reducing flood risk in the watershed.

The Clear Creek General Reevaluation Report (GRR) provides planning, engineering, and implementation details of the recommended restoration plan to allow final design and construction to proceed subsequent to the approval of the plan. The Clear Creek Preliminary

Draft Environmental Impact Assessment (PDEIS) was conducted in compliance with the National Environmental Policy Act (NEPA) (40 CFR § 1500-1508) to evaluate the potential environmental impacts of the proposed actions and reasonable alternatives to those actions. The Clear Creek general reevaluation study goal is to prepare a decision document that identifies several plans for reducing flood risks in the Clear Creek watershed as Congress intended and in a manner that is cost effective and minimizes environmental impacts. The Clear Creek GRR analyzes the work done in past reports in an effort to lower the working cost and minimize environmental impacts.

USACE conducted an Independent External Peer Review (IEPR) of the Clear Creek, Texas Flood Risk Management Revised General Reevaluation Report and Preliminary Draft Environmental Impact Statement (hereinafter referred to as the Clear Creek GRR and PDEIS) in 2009. Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Clear Creek GRR and PDEIS. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2010), USACE (2007), and OMB (2004).

Comments from the IEPR Panel were taken into consideration for revising the Clear Creek GRR and PDEIS. USACE is now conducting a follow-up IEPR of the Clear Creek GRR and PDEIS, coordinated by Battelle, to determine whether comments from the original IEPR were adequately addressed. This final report describes the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel).

Six panel members were selected for the IEPR Panel. Based on the technical content of the Clear Creek GRR and PDEIS and the overall scope of the project, the final panel members were selected for their technical expertise in the following key areas: geotechnical engineering (one expert with experience in fluvial processes and geomorphology and one expert with geotechnical risk analysis expertise), economics, hydraulic engineering, coastal and riparian ecology, and NEPA impact assessment. Five of the six panel members served on the original IEPR Panel in 2009. The ecologist from the original IEPR Panel was not available; therefore, the ecologist who served on the model review panel for the Clear Creek Community Models was selected by Battelle for the follow-up IEPR because of relevant expertise, familiarity with the project, and availability.

The IEPR Panel received electronic versions of the Clear Creek GRR and PDEIS, along with a charge that solicited feedback on whether the Final Panel Comments from the original IEPR had been addressed adequately. The Clear Creek Flood Risk Management Project Delivery Team from USACE briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review. Other than this teleconference, there was no direct communication between the Panel and USACE during the peer review process. The Panel responded to 3 charge questions for each of the 27 Final Panel Comments from the original IEPR.

1. Were your comments adequately addressed in the Revised Clear Creek GRR and PDEIS?
2. If your comments were not adequately addressed, please explain why and what issues remain.
3. Are there any additional issues that have developed as a result of revisions made to address comments on the Draft GRR and PDEIS?

Panel members were instructed to respond to these questions only for the original Final Panel Comments that they developed.

IEPR panel members reviewed the Revised Clear Creek GRR and PDEIS individually. The panel members then met via teleconference with Battelle to review whether the original Final Panel Comments had been adequately addressed, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments describing any new or remaining issues to be provided to USACE. Each Final Panel Comment was documented using the following four-part format: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 13 Final Panel Comments were identified and documented. Of these, 3 were identified as having high significance, 6 had medium significance, and 4 had low significance.

Table ES-1 summarizes the Final Panel Comments by level of significance. Detailed information on each comment is contained in Appendix A of this report.

Table ES-1. Overview of 13 Final Comments Identified by the Clear Creek GRR and PDEIS Follow-up IEPR Panel

Significance – High	
1	Justification for why Section 575 covers the Mary’s Creek detention basin and why it is not included in the Without Project condition needs to be provided.
2	The values used in the Economic Evaluation need to be updated directly from 2001 values to current values.
3	Risk and uncertainty have not been fully implemented in evaluating and formulating alternatives.
Significance – Medium	
4	More detailed, specific discussion and reference to historic data related to geologic hazards, including slides and slumps, faulting, organic deposits, subsidence, factors of safety, and settlement should be provided.
5	The proposed approach to establishing and maintaining benchmarks is not feasible because of regional subsidence.
6	A comprehensive restoration plan needs to be developed and should describe how the restoration will be achieved, estimate project costs, and allow effective post-construction monitoring of project success.

7	The stability analysis section of the GRR should be expanded to address the use of “Setback Zones” near the top of slopes.
8	Benefits from the second outlet should be included when considering induced damages.
9	The mitigation plan does not explicitly describe its elements and whether the goal of No Net Loss of wetlands would be accomplished.
Significance – Low	
10	The period for the Habitat Evaluation Procedures (HEP) projections is inconsistent with the referenced census tract population projections.
11	There appears to be inconsistency between the GRR and PDEIS in the reporting of forest floodplain impacts.
12	Areas that require erosion protection should be identified to aid in developing preliminary construction costs associated with providing erosion protection.
13	A stronger justification needs to be provided for the final selection of the 18 variables that make up the Floodplain Forest Community Index Model.

The Panel was pleased overall with the improvement in the document since the 2009 review. They agreed that the technical quality and readability of the report was greatly improved. In the Panel’s opinion, the document now does a good job of explaining the project, history of the project, and need for the project. Although most of the analyses were determined to be acceptable, the economic, geotechnical, and risk and uncertainty analyses that provide the basis for the plan formulation were still limited or lacking. The Panel felt there were some additional issues that needed to be explained more fully. The following statements summarize the Panel’s findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation: The inclusion of the public involvement helped in gaining an understanding of how the Recommended Plan was determined. Most of the remaining comments dealing with plan formulation are items that do not appear to have been addressed in adequate depth for a complete understanding of the plan formulation process.

Economics: While some of the comments were handled well and fully addressed, others were not addressed as fully as the Panel would have liked. The Panel still has questions in regards to the risk and uncertainty analysis and some of the assumptions that were used in the analysis. The Panel generally felt that inclusion of additional discussion and documentation will address the remaining issues unless the underlying assumptions were flawed. These underlying assumptions cannot be determined from the data presented, but the analyses do not appear to have any major flaws based on the data and information presented in the reports. The transfer of much of the economic analysis detail to the appendices improved the readability of the report.

Engineering: Most of the comments regarding the engineering analyses were adequately addressed. The Panel would like to see an estimate included for the amount of scour protection required for cost estimating, and some geotechnical issues are still not clear.

Environmental: Most of the environmental comments have been addressed, and the elimination of the coastal prairie model made the report much simpler and easier to understand and the habitat analysis more technically sound. The documentation of the habitat model was also greatly improved in the reports, and remaining issues are primarily with the presentation of the data and the model.

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Attachment A. Sample of Value Improvement Calculation for Mud Gully for the Clear Creek
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LIST OF ACRONYMS

AAHUs	Average Annual Habitat Units
AEP	Annual Exceedence Probability
ATR	Agency Technical Review
COI	Conflict of Interest
DrChecks®	Design Review and Checking System
EA	Environmental Assessment
EC	Engineering Circular
EIS	Environmental Impact Statement
fps	feet per second
GRR	General Reevaluation Report
HEP	Habitat Evaluation Procedures
IEPR	Independent External Peer Review
MSL	Mean Sea Level
NED	National Economic Development
NEPA	National Environmental Policy Act
NTP	Notice to Proceed
OMB	Office of Management and Budget
PDEIS	Preliminary Draft Environmental Impact Statement
SPA	Sponsor Proposed Alternative
USACE	United States Army Corps of Engineers

1. INTRODUCTION

The U.S. Army Corps of Engineers (USACE) has been directed by Congress to develop the Clear Creek General Reevaluation Report (GRR). Clear Creek drains an area south of and partially within the city of Houston, Texas. The Clear Creek watershed is located in four counties, includes 16 cities, and covers approximately 260 square miles of land. The watershed is composed of relatively flat coastal plain with elevations varying from near sea level at Clear Lake on the eastern edge of the watershed to about 75 feet above mean sea level (MSL) on the western watershed boundary. Clear Creek receives flow from 17 principal tributaries. The Clear Creek watershed 1 percent (100-year) annual exceedance probability (AEP) floodplain contains an area of approximately 19,000 acres. Many communities and subdivisions along the creek are subject to flooding, and recent floods (1973, 1976, twice in 1979, 1989, October 1994, and June 2001) have caused extensive property damage.

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A restudy was initiated in the early 1970s. In 1982 a modified project was recommended that changed the previous 1 percent (100-year) AEP flood event level of protection in the 1968 authorization to a 10 percent (10-year) AEP flood event level. The new plan required less channel modification and included nonstructural measures. Construction began in the mid-1990s. Subsequently, public concerns about potential environmental and hydraulic impacts led the project sponsors to request that construction be suspended. The Harris County Flood Control District developed a Sponsor Proposed Alternative (SPA) that is substantially different from the authorized project. Therefore, Galveston District initiated a general reevaluation study in 1999 to determine a technically effective and publicly acceptable solution to reducing flood risk in the watershed.

The Clear Creek GRR provides planning, engineering, and implementation details of the recommended restoration plan to allow final design and construction to proceed subsequent to the approval of the plan. The Clear Creek Preliminary Draft Environmental Impact Assessment (PDEIS) was conducted in compliance with the National Environmental Policy Act (NEPA) (40 CFR § 1500-1508) to evaluate the potential environmental impacts of the proposed actions and reasonable alternatives to those actions. The Clear Creek general reevaluation study goal is to prepare a decision document that identifies several plans for reducing flood risks in the Clear Creek watershed as Congress intended and in a manner that is cost effective and minimizes environmental impacts. The Clear Creek GRR analyzes the work done in past reports in an effort to lower the working cost and minimize environmental impacts.

USACE conducted an Independent External Peer Review (IEPR) of the Clear Creek, Texas Flood Risk Management Revised General Reevaluation Report and Preliminary Draft Environmental Impact Statement (hereinafter referred to as the Clear Creek GRR and PDEIS) in 2009. The review was conducted in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010), USACE CECW-CP memorandum *Peer Review Process* (USACE, 2007), and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the IEPR of the Clear Creek GRR and PDEIS. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

Comments from the IEPR Panel were taken into consideration for revising the Clear Creek GRR and PDEIS. USACE is now conducting a follow-up IEPR of the Clear Creek GRR and PDEIS, coordinated by Battelle, to determine whether comments from the original IEPR were adequately addressed. This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and hydrologic and hydraulic engineering analyses contained in the Revised Clear Creek GRR and PDEIS with regards to the degree to which issues identified during the original IEPR were addressed. Detailed information on the Final Panel Comments is provided in Appendix A.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review (ATR), as described in USACE (2010) and USACE (2007).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR and follow-up IEPR of the Clear Creek GRR and PDEIS was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization under section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the methods followed in selecting the members for the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described in USACE (2010) and in accordance with USACE (2007) and OMB (2004).

Supplemental guidance on evaluation for conflicts of interest was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

After receiving the notice to proceed (NTP), Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 defines the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the NTP date of May 27, 2010. Note that the work items listed in Task A8 occur after the submission of this report. Battelle will enter the 13 Final Panel Comments into USACE’s Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE and the Panel can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (Backcheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle.

Table 1. Clear Creek GRR and PDEIS Follow-up IEPR Schedule

TASK	ACTION	DUE DATE
A1	Notice to Proceed (NTP)	5/27/2010
	Review documents available	6/2/2010
	End of Period of Performance	12/31/2010
	Battelle submits draft Work Plan ^a	6/9/2010
	USACE provides comments on draft Work Plan	6/10/2010
	Teleconference (if necessary)	6/10/2010
	Battelle submits final Work Plan ^a	6/11/2010
A2 & A4	Battelle requests input from USACE on the conflict of interest (COI) questionnaire	6/4/2010
	USACE provides comments on COI questionnaire	6/8/2010
	Battelle submits list of selected panel members ^a	6/4/2010
	USACE provides comments on selected panel members	6/4/2010
	Battelle completes subcontracts for panel members	6/11/2010
A3	Battelle submits draft Charge (combined with draft Work Plan – Task 1) ^a	6/9/2010
	USACE provides comments on draft Charge	6/10/2010
	Battelle submits final Charge (combined with final Work Plan – Task 1) ^a	6/11/2010
	USACE approves final Charge	6/14/2010

TASK	ACTION	DUE DATE
A5	USACE/Battelle kick-off meeting	6/4/2010
	Review documents sent to panel members	6/14/2010
	USACE/Battelle/IEPR Panel kick-off meeting	6/15/2010
	Panel members complete their reviews	6/29/2010
A6	Convene panel review teleconference	7/2/2010
	Panel provides draft Final Panel Comments to Battelle	7/12/2010
A7	Battelle submits Final IEPR Report ^a	7/23/2010
A8^b	Battelle inputs Final Panel Comments to DrChecks	7/27/2010
	USACE provides draft Evaluator Responses and clarifying questions	7/30/2010
	Teleconference between Battelle, IEPR Panel, and USACE to discuss Final Panel Comments, draft Evaluator responses, and clarifying questions	8/6/2010
	USACE inputs final Evaluator responses in DrChecks	8/13/2010
	Battelle inputs the Panel's BackCheck responses in DrChecks	8/19/2010
	Battelle submits pdf printout of DrChecks project file ^a and closes out DrChecks	8/20/2010
	Project closeout	10/26/2010

^a Deliverable

^b Task occurs after the submission of this report.

3.2 Identification and Selection of IEPR Panel Members

Because the purpose of the follow-up IEPR was to determine whether issues identified during the original IEPR had been adequately addressed, it was desirable to have as many of the original panel members on the follow-up IEPR Panel as possible. Battelle contacted the six experts from the original Clear Creek IEPR Panel to inquire about their availability and interest in participating in the follow-up IEPR. Five of the original six panel members responded and agreed to participate. The ecologist from the original IEPR panel was not available; therefore, the ecologist who served on the model review panel for the Clear Creek Community Models was selected by Battelle for the follow-up IEPR because of relevant expertise, familiarity with the project, and availability. Information about the new panel member, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback.

The candidates were screened again for the following potential exclusion criteria or conflicts of interest to determine whether any conflicts of interest had developed since the original IEPR and model review.¹

- Involvement in any USACE Clear Creek project, including but not limited to producing the Clear Creek General Reevaluation Report, related technical and supporting appendices, and models pertaining to Clear Creek;
- Involvement in other flood risk management projects for Texas floodplains;
- Current USACE employee;
- Current employee of a cooperating agency for Clear Creek flood risk management projects (e.g., Harris County Flood Control District [HCFCD], Galveston County, Brazoria Drainage District #4, United States Fish and Wildlife Service [USFWS], National Marine Fisheries Service [NMFS], United States Environmental Protection Agency [USEPA], and Natural Resource Conservation Service [NRCS]) and currently working on Texas flood risk management projects;
- Other USACE affiliation;
- A significant portion (i.e., greater than 80%) of personal or company revenues within the last 3 years came from USACE contracts for projects specific to Galveston District;
- Current or future financial interests in Clear Creek-related contracts/awards from USACE;
- Any publicly documented statement made by the reviewer or reviewer's firm advocating for or against the subject project;
- Other possible perceived conflict of interest for consideration, e.g.,
 - Former USACE employee
 - Repeatedly served many times as USACE technical reviewer.

Battelle confirmed that no conflicts of interest had developed for any of the reviewers since the original IEPR and the model review. The six selected reviewers were either affiliated with academic institutions or consulting companies. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of conflicts of interest through a signed Conflict of Interest form. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within 2 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by

¹ Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

Battelle in order to review the IEPR process and objectives, the schedule, communication, and other pertinent information for the Panel.

3.3 Preparation of the Charge and Conduct of the IEPR

Battelle drafted a preliminary charge document, including specific charge questions and discussion points. The draft charge was prepared by Battelle to assist USACE in the development of the charge questions that will guide the peer review, according to guidance provided in USACE (2010) and OMB (2004). The draft charge was submitted to the USACE for evaluation as part of the draft Work Plan. USACE provided comments and revisions to the draft charge, which were used to produce the final charge. The final charge was submitted to USACE for approval. In addition to a list of three charge questions/discussion points for each of the 27 Final Panel Comments from the original IEPR, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report). Panel members were instructed to respond to the charge questions only for the original Final Panel Comments that they developed. Three questions were asked regarding each of the 27 Final Panel Comments.

1. Were your comments adequately addressed in the Revised Clear Creek GRR and PDEIS?
2. If your comments were not adequately addressed, please explain why and what issues remain.
3. Are there any additional issues that have developed as a result of revisions made to address comments on the Draft GRR and PDEIS?

Battelle planned and facilitated a final kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meeting, the IEPR Panel received an electronic version of the revised Clear Creek GRR and PDEIS and the final charge. A full list of the documents reviewed by the Panel is provided in Appendix B of this report. The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

3.4 Review of Individual Comments

The Panel produced approximately 95 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify which of the 27 Final Panel Comments from the original review had been address, remaining issues, and new issues that developed as a result of revisions to the Clear Creek GRR and PDEIS. As a result of the review, Battelle determined (and later confirmed with the Panel) that 17 of the 27 Final Panel Comments had been fully addressed, 2 had been partially addressed, and 8 had not been addressed. Battelle was able to summarize the remaining issues into a preliminary list of 30 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel experts, many of whom are from diverse scientific backgrounds, could exchange technical information. The main goal of the teleconference was to identify any remaining issues that should be carried forward as Final Panel Comments and to decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the final

IEPR report would accurately represent the Panel's assessment of the revised Clear Creek GRR and PDEIS, including any conflicting opinions. The Panel engaged in a thorough discussion of the extent to which the 27 Final Panel Comments from the original IEPR had been addressed, positive comments, and comments that appeared to be conflicting among panel members. In addition, Battelle confirmed each comment's level of significance with the Panel, determined whether there were any missing issues of high-level importance, and merged any related individual comments.

The Panel also discussed responses to charge questions for four of the original Final Panel Comments where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel; each comment was either incorporated into a Final Panel Comment or determined to be a non-significant issue (i.e., a true disagreement did not exist).

At the end of these discussions, the Panel identified 13 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel that documented each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Clear Creek GRR and PDEIS:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed merged individual comments in the comment-response form table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and a template for the preparation of the Final Panel Comments.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with other IEPR panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium, low; see description below)
 4. Recommendation for Resolution (see description below).
- **Criteria for Significance:** The following were used as criteria for assigning a significance level to each Final Panel Comment:

1. High: Describes a fundamental problem with the project that could affect the recommendation or justification of the project
 2. Medium: Affects the completeness or understanding of the reports/project
 3. Low: Affects the technical quality of the reports but will not affect the recommendation of the project.
- Guidance for Developing the Recommendation: The recommendation was to include specific actions that the USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

At the end of this process, 13 Final Panel Comments were prepared and assembled. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

As requested by USACE, most panel members for the follow-up IEPR of the Clear Creek GRR and PDEIS were those who served on the Panel for the original IEPR. The ecologist from the original Panel was not available; therefore, the ecologist from the Panel for the Clear Creek Community Models review was invited to participate in the follow-up IEPR because of relevant expertise and familiarity with the project.

An overview of the credentials of the final six members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. Clear Creek GRR and PDEIS Follow-up IEPR Panel: Technical Criteria and Areas of Expertise

	Gilbert	Bruggers	Mantey	Freeman	Wilcox	Henry
Geotechnical Engineer (two experts: one in fluvial processes and geomorphology and one in geotechnical risk analysis)						
Experience in geotechnical studies and design of flood control works, including channel modifications	✓	✓				
Familiar with geotechnical practices used in Texas	✓					
Site investigation planning and implementation including:	✓	✓				
• Modification of stream channels for flood risk management purposes		✓				
• Minimizing environmental impacts	✓	✓				
Fluvial processes		✓				
Geomorphology		✓				
Geotechnical risk analysis	✓					
Application of probabilistic methods to geotechnical aspects of flood damage reduction planning studies	✓					
Economics (one expert)						
Water resource economic evaluation or review (<i>years of experience needed: 10</i>)			✓ Years of exp: 30			
Experience working directly for or with USACE (<i>years of experience needed: 5</i>)			✓ Years of exp: 25			
Experience with the HEC-FDA model (<i>years of experience needed: 5</i>)			✓ Years of exp: 8			
Experience reviewing federal water resource economic documents justifying construction efforts (<i>years of experience needed: 2</i>)			✓ Years of exp: 8			
Understanding of social well-being and regional economic development			✓			
Understanding of traditional natural economic development benefits			✓			

Table 3. Clear Creek GRR and PDEIS Follow-up IEPR Panel: Technical Criteria and Areas of Expertise (continued)

	Gilbert	Bruggers	Mantey	Freeman	Wilcox	Henry
Hydraulic Engineer (one expert)						
Registered professional engineer				✓		
Experience working with large public works projects				✓		
Extensive background in hydraulic theory and practice (if from academia)				✓		
Familiar with USACE application of risk and uncertainty analyses in flood damage reduction studies				✓		
Familiar with standard USACE hydrologic and hydraulic computer models				✓		
Coastal Prairie and Riparian Ecology (one expert)						
Experience in describing and evaluating the complex relationships and dynamics of coastal prairie and/or riparian ecosystems (<i>years of experience needed: 10</i>)					✓ Years of exp: 25	
Experience assessing the consequences of altering environmental conditions					✓	
NEPA Impact Assessment (one expert)						
Experience in evaluating and conducting NEPA impact assessments (<i>years of experience needed: 10</i>)						✓ Years of exp: 10
Conducting cumulative effects analyses						✓
Experience with complex multi-objective public works projects with competing trade-offs						✓
Experience determining the scope and appropriate methodologies for impact assessment and analyses for a variety of projects with high public and interagency interest						✓
Experience determining the scope and appropriate methodologies for impact assessment and analyses for projects having impacts to nearby sensitive habitats						✓

Robert Gilbert, PhD., P.E.

Role: This reviewer was chosen primarily for his expertise in the area of geotechnical risk analysis.

Affiliation: University of Texas

Dr. Robert Gilbert is the Brunswick Abernathy Professor of Civil, Architectural, and Environmental Engineering at the University of Texas-Austin. He holds a Ph.D. in civil engineering from the University of Illinois at Urbana-Champaign and is a licensed professional engineer in Texas and Illinois. He currently teaches a short course on risk and reliability analyses for levees and dams, and teaches geoenvironmental and geotechnical engineering as well as risk-based decision-making, and probability and statistics at the university. Dr. Gilbert served as a technical reviewer for the New Orleans Levee Failures in Hurricane Katrina and the California Delta Risk Management Strategy, and was on the Science and Engineering Review Team for Louisiana's Master Plan for Coastal Protection and Restoration. He was a member of the editorial board for the journal *Georisk*. He has also worked on risk assessments for such varied projects as tailings dams, offshore oil and gas production and transportation systems, and hazardous and nuclear waste landfills. Dr. Gilbert has provided private engineering consulting services for the past 16 years to numerous agencies and companies, including the USACE.

Donald Bruggers, P.E.

Role: This reviewer was chosen primarily for his geotechnical expertise in fluvial processes and geomorphology.

Affiliation: ENGEIO Incorporated

Donald Bruggers has an M.S.C.E. in geotechnical engineering from Michigan State University and has more than 30 years of diverse geotechnical engineering experience. He is currently a principal with ENGEIO Incorporated in San Francisco, CA, and is a registered geotechnical engineer in California and a registered P.E. in four states. He has managed large-scale, complex projects throughout the western United States. His areas of expertise include land stability assessment and mitigation; tunneling, pier, port, marina and levee projects; transportation and public works projects; and environmental remediation, compliance, and permitting. Mr. Bruggers has provided technical direction/review of several stream restoration projects that have required an understanding of the fluvial processes and geomorphology of watersheds, as well as design and construction of drop structures and channel modification. Specifically, San Ramon Creek at El Capitan Bridge required widening and realignment intervention because the channel had migrated laterally into the existing bridge abutment, threatening its integrity. Mitigation included grading to provide stable channel dimensions for the creek, toe scour protection with biotechnical stabilization at creek bendways, and the installation of an active floodplain with riparian planting. Mr. Bruggers also provided principal technical review for the Main Branch of Alamo Creek, which had eroded heavily into its historic floodplain and was largely devoid of riparian habitat features or beneficial water quality mechanisms. The project included the construction of a series of rock vortex weir grade-control structures to adjust the over-steepened creek bed slope to an 'equilibrium' that would balance the sediment transport throughout the project reach after restoration. Mr. Bruggers also provides principal review services for the geotechnical evaluation of levees protecting California urban areas and is currently assessing

whether 12 miles of levee along the Sutter Bypass and Wadsworth Canal meet the applicable standards.

Joseph Mantey

Role: This reviewer was chosen primarily for his expertise in evaluating the social, regional, and traditional economic benefits of water resource development programs.

Affiliation: Oakland Community College

Joseph Mantey has 30 years of experience in water resource economics and has an M.S. in agricultural economics from the University of California at Davis. Before taking his current position as an economics faculty member at Oakland Community College, Mr. Mantey worked as an economist for the USACE for 20 years, including 4 years as a Supervisory Economist at the Los Angeles District. His fields of expertise include economic and social impact studies, benefit-cost analyses, risk and uncertainty analyses, environmental impact assessments, and peer reviews. He has 8 years of experience with HEC-FDA software, most recently using it to conduct detailed technical reviews of three large flood control projects for the Harris County Flood Control District. He also participated in an IEPR team reviewing part of the Comprehensive Everglades Restoration Plan. Mr. Mantey has experience managing a multi-disciplinary GRR team that earned a national award for reducing construction costs of a new shipping lock at the Soo Canal, and he led the economic analysis team in estimating project impacts on deep-draft navigation in the Great Lakes.

Gary Freeman, PhD. P.E.

Role: This reviewer was chosen primarily for his expertise in the area of hydraulic engineering, and his familiarity with the USACE risk and uncertainty analysis and hydrologic/ hydrodynamic computer models.

Affiliation: River Research and Design, Inc.

Dr. Gary Freeman is a principle and majority owner of River Research and Design (R₂D) with more than 20 years of experience in dealing with water-related engineering issues. He received his Ph.D. in civil engineering from Texas A&M University, is a registered Civil Engineer in eight states, and has taught stream restoration courses for the American Society of Civil Engineers (ASCE). With a wide range of experience in water resources engineering, Dr. Freeman has been intricately involved in performing and directing hydraulics, hydrology, sediment transport, and geomorphology studies across the United States and internationally. Dr. Freeman's training and broad background in hydraulics and sediment transport also qualify him as a fluvial geomorphologist. Dr. Freeman spent 7½ years with the U.S. Army Waterways Experiment Station in Vicksburg, MS as a Research Hydraulic Engineer. While at USACE, Dr. Freeman modified and applied USACE's RMA-2 hydrodynamic model to a wide variety of projects and helped train USACE personnel in the use of two-dimensional hydrodynamic and sediment transport models. He served as principal investigator on several large research projects including the development of stage-discharge uncertainty methodology for the risk and uncertainty approach to flood damage reduction studies, hydraulic roughness of floodplains due to shrubs and other woody vegetation, and the modeling of sediment transport in bottomland hardwood wetlands.

Brad Wilcox, PhD.

Role: This reviewer was chosen primarily for his expertise in the area of coastal and riparian ecology.

Affiliation: Texas A&M University

Dr. Brad Wilcox is a Professor in the Department of Rangeland Ecology and Management at Texas A&M University. He holds a Ph.D. in range hydrology from New Mexico State University and has 25 years of experience researching a variety of topics related to coastal prairie and riparian (as well as upland) ecosystems. His technical expertise is in ecohydrology, watershed management, and flooding dynamics as influenced by land use, soils, and geomorphology. His current research responsibilities include understanding the hydrologic processes in shrublands, wetlands, and forested watersheds and studying how vegetation cover and vegetation management on rangelands affect water quantity and quality, at multiple scales (including the hillslope, watershed, and landscape). He has over 60 peer-reviewed publications to his name and is affiliated with the Society for Range Management, the American Geophysical Union, and the Ecological Society of America.

Kelly Henry

Role: This reviewer was chosen primarily for her expertise in evaluating and conducting NEPA impact assessments for projects and programs with interagency interests and potential impacts to nearby sensitive habitats.

Affiliation: Short, Elliott, Hendrickson, Inc.

Kelly Henry is the director of the Natural Resources Group at Short, Elliott, Hendrickson, Inc. in St. Paul, MN, and is a certified Professional Wetland Scientist. She has an M.S. in ecology and water resources and is experienced in environmental reporting and documentation including Environmental Impact Statements (EISs), Environmental Assessments (EAs) and Environmental Assessment Worksheets. She also is experienced in wetland regulation and in obtaining permits from federal, state and local wetland regulatory agencies, including wetland delineation, impact analysis and mitigation. Her project experience includes conducting numerous EAs and EISs for the Federal Aviation Administration for a variety of airports in Minnesota. Many of these projects included assessing the potential impacts of airport changes to nearby sensitive habitats, including threatened and endangered plant species as well as wetland habitat, which required coordinating with the USACE, Minnesota Department of Natural Resources, and local regulatory agencies. Ms. Henry was the project manager for a recently-completed EIS for the proposed expansion of mining activities at Ispat Inland Mining East Reserve. Project issues included the assessment of potential effects to municipal water supplies, impacts to streams from dewatering activities, and treatment for mercury in accordance with the Great Lakes Initiative.

5. SUMMARY OF FINAL PANEL COMMENTS

The Panel was pleased overall with the improvement in the document since the 2009 review. They agreed that the technical quality and readability of the report was greatly improved. In the Panel's opinion, the document now does a good job of explaining the project, history of the project, and need for the project. Although most of the analyses were determined to be

acceptable, the economic, geotechnical, and risk and uncertainty analyses that provide the basis for the plan formulation were still limited or lacking. The Panel felt there were some additional issues that needed to be explained more fully. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation: The inclusion of the public involvement helped in gaining an understanding of how the Recommended Plan was determined. Most of the remaining comments dealing with plan formulation are items that do not appear to have been addressed in adequate depth for a complete understanding of the plan formulation process.

Economics: While some of the comments were handled well and fully addressed, others were not addressed as fully as the Panel would have liked. The Panel still has questions in regards to the risk and uncertainty analysis and some of the assumptions that were used in the analysis. The Panel generally felt that inclusion of additional discussion and documentation will address the remaining issues unless the underlying assumptions were flawed. These underlying assumptions cannot be determined from the data presented, but the analyses do not appear to have any major flaws based on the data and information presented in the reports. The transfer of much of the economic analysis detail to the appendices improved the readability of the report.

Engineering: Most of the comments regarding the engineering analyses were adequately addressed. The Panel would like to see an estimate included for the amount of scour protection required for cost estimating, and some geotechnical issues are still not clear.

Environmental: Most of the environmental comments have been addressed, and the elimination of the coastal prairie model made the report much simpler and easier to understand and the habitat analysis more technically sound. The documentation of the habitat model was also greatly improved in the reports, and remaining issues are primarily with the presentation of the data and the model.

Table 3 lists the 13 Final Panel Comment statements by level of significance.

Table 4. Overview of 13 Final Panel Comments Identified by Clear Creek GRR and PDEIS Follow-up IEPR Panel

Significance – High	
1	Justification for why Section 575 covers the Mary’s Creek detention basin and why it is not included in the Without Project condition needs to be provided.
2	The values used in the Economic Evaluation need to be updated directly from 2001 values to current values.
3	Risk and uncertainty have not been fully implemented in evaluating and formulating alternatives.
Significance – Medium	
4	More detailed, specific discussion and reference to historic data related to geologic hazards, including slides and slumps, faulting, organic deposits, subsidence, factors of safety, and settlement should be provided.
5	The proposed approach to establishing and maintaining benchmarks is not feasible because of regional subsidence.
6	A comprehensive restoration plan needs to be developed and should describe how the restoration will be achieved, estimate project costs, and allow effective post-construction monitoring of project success.
7	The stability analysis section of the GRR should be expanded to address the use of “Setback Zones” near the top of slopes.
8	Benefits from the second outlet should be included when considering induced damages.
9	The mitigation plan does not explicitly describe its elements and whether the goal of No Net Loss of wetlands would be accomplished.
Significance – Low	
10	The period for the Habitat Evaluation Procedures (HEP) projections is inconsistent with the referenced census tract population projections.
11	There appears to be inconsistency between the GRR and PDEIS in the reporting of forest floodplain impacts.
12	Areas that require erosion protection should be identified to aid in developing preliminary construction costs associated with providing erosion protection.
13	A stronger justification needs to be provided for the final selection of the 18 variables that make up the Floodplain Forest Community Index Model.

6. REFERENCES

OMB (2004). Final Information Quality Bulletin for Peer Review. Executive Office of the President, Office of Management and Budget, Washington, DC. Memorandum M-05-03. December 16.

The National Academies (2003). Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports. The National Academies (National Academy of Science, National Academy of Engineering, Institute of Medicine, National Research Council). May 12.

USACE (2007). Peer Review Process. Department of the Army, US Army Corps of Engineers, Washington, DC. CECW-CP Memorandum. March 30.

USACE (2009). Water Resources Policies and Authorities: Incorporating Sea-Level Change Considerations in Civil Works Programs. Department of the Army, US Army Corps of Engineers, Washington, DC. Engineer Circular (EC) No. 1165-2-211. July 1.

USACE (2010). Water Resources Policies and Authorities: Civil Works Review Policy. Department of the Army, US Army Corps of Engineers, Washington, DC. Engineer Circular (EC) No. 1165-2-209. January 31.

USGS (1975). "Land-Surface Subsidence in the Houston-Galveston Region, Texas," United States Geological Survey, Report 188.

APPENDIX A

Final Panel Comments

from the

**Clear Creek, Texas Flood Risk Management General Reevaluation Report and
Preliminary Draft Environmental Impact Statement Follow-up IEPR**

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Comment 1:

Justification for why Section 575 covers the Mary’s Creek detention basin and why it is not included in the Without Project condition needs to be provided.

Basis for Comment:

The local sponsor previously constructed detention basins on Mary’s Creek. Whether that construction is eligible for Section 575 treatment remains a concern. If the detention is not eligible for Section 575, then damages, especially those along Mary’s Creek itself, are overstated for the Without Project condition. If detention is eligible for Section 575, then the detention needs to be included in the Tentatively Recommended Plan.

The CECW-PC Guidance for Implementing 575 in Appendix A does not mention Clear Creek. The CECW-PC Guidance applies to a specific project, “Buffalo Bayou and tributaries,” authorized in 1990, and this project had a total cost estimate of \$727,364,000. It is not clear whether any part of that specific project is in the Clear Creek watershed. The General Reevaluation Report (GRR) states that the “Clear Creek watershed” is a tributary of Buffalo Bayou (p.88), but Clear Creek is not a tributary to Buffalo Bayou. The Clear Creek reaches extend to Galveston Bay and the project includes a second outlet to the bay.

Assuming the detention basins are eligible for Section 575, eligibility should apply to the entire detention and not just to 75% of it. It is not possible to check the reasonableness of the cost share totals in Table 27 nor discern whether they represent all of the detention basins assumed to be eligible for Section 575. The total project output (i.e., the reduction in flood damages) required by the CECW-PC Guidance should be clearly defined. Then, the incremental benefits and costs of the channel as a second added feature should be clearly displayed. The Assistant Secretary of the Army for Civil Works interpretation of Section 575 in Appendix A seems to be that the channel can be constructed up to the size optimized as a first added increment. However, the local sponsor can opt for a smaller channel. Rationally, this should occur if the channel increments (measured in cross-section or linear extent) have a benefit-to-cost ratio less than their cost-sharing requirements. The total project output should also be defined in terms of the total project. It may be more efficient to reduce residual damages on the Clear Creek main stem than on Mary’s Creek.

From the incremental analysis shown in Table 2-8 of the Economic Appendix, it seems clear that the constructed detention basin is inefficiently sized (larger than optimal) as a second increment. Since it cannot be re-sized and it was constructed as a first increment, the Panel believes that the remaining channel construction should be optimally sized. As an example, with a detention basin considered as a first increment, the optimal channel to achieve the total project output may be smaller just downstream of that basin and larger further downstream.

The total cost of conveyance on Mary’s Creek was \$8.5 million, as shown in Table 2-8. The Cost Appendix displays a total Mary’s Creek Conveyance (sic) cost of \$16.5 million. The project should be optimized with the most recent information.

In the end, the description of Tentatively Recommended Plan does not include detention on Mary's Creek. This omission does not seem to be in agreement with Section 575 guidance, and the rationale for applying Section 575 and the required analysis seems incomplete. If the buyouts in this area are eligible for Section 575 treatment, the Panel is satisfied with their treatment in the GRR.

Significance – High:

If the detention on Mary's Creek is not eligible for Section 575, then the proposed conveyance along Mary's Creek is most likely oversized, if it is economically justified at any size.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. A specific explanation of how specific language in Section 575 applies to Clear Creek.
2. Identification of the total project output as defined in Step 3 of the Implementation Guidance.
3. Reformulation of the Tentatively Recommended Plan to provide the total project outputs throughout the study area to more efficiently achieve the total project output.
4. Identification of Section 575 features in the Tentatively Recommended Plan.

Comment 2:

The values used in the Economic Evaluation need to be updated directly from 2001 values to current values.

Basis for Comment:

The initial 2001 structure values from assessor data are not in question. They seem reasonable to the Panel and the U.S. Army Corps of Engineers (USACE) has not pointed out any shortcomings or errors related to the values initially assigned to development in the floodplain. The Panel's recommendation is to update directly from 2001 to current prices.

- While the price level was updated, it was not updated directly from 2001 to current prices. The update only adjusted 2007 values for deflation over the last 2 yrs. As is, it is based on values the Panel continues to question.
- The statement that “percent increase in tax assessor values from 2001 base takes into account the...homestead value limitations and price level changes,” and the claim that it was therefore necessary to rely on the 2005 sample appraisals is not accurate. Harris County assessment records ignore the cap when assigning market values for land and improvements. The cap, which rarely applies, only applies to the total value of land and improvements. Galveston and Harris Counties post their assessment data online, and it is easy to discern the value of improvements, unaffected by any cap, from these records.
- Values from the 2005 sample appraisal are not representative of long-term replacement values because of their post-Katrina timing and the inconsistency of the appraisal's findings with other indices.
- In order to check the reasonableness of the 1.68 update factor used in the GRR, the Panel randomly sampled 50 residential structures in the Mud Gully floodplain, which is in Harris County. The Panel found that the value improvements average 34% greater in 2009 than in 2001. A spreadsheet displaying these results is attached (see Attachment A). Use of the 1.68 factor implies that current structure market values in the Harris County assessor records, either in 2001 or 2009, should be increased by about 25% to obtain true market values. The GRR does not make this case.
- The price level discussion about Residential Property Values repeatedly refers to 2010 price levels. However, the analysis is based on Oct 1, 2009 prices.

Significance – High:

Benefits are directly related to valuation. If valuations are over-estimated, then so are benefits, and justification for and optimization of some project features may be in question.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. A direct update from 2001 structure values to 2009 values (and reference to 2009 rather than 2010 values).
2. Incremental analysis of recommended features using current costs, discount rates, and benefits.

Comment 3:

Risk and uncertainty have not been fully implemented in evaluating and formulating alternatives.

Basis for Comment:

Evaluation of the project alternatives does not discuss risk and uncertainty for any of the analyses.

- There is no information presented in the main text of the GRR about uncertainty in the economic values for benefits and costs. The values that are presented all represent expected values, but they are presented as deterministic rather than expected values. Also, the values that are presented are shown with too many significant figures, conveying that there is very little uncertainty in these estimates.
- Uncertainty in benefits due to uncertainty in population growth between 2020 and 2070 is not considered.
- There is no comparison of the estimated damages from flooding to actual damages from the historical record in order to evaluate the accuracy of the flood and damage models.
- Uncertainty in flood damage due to regional subsidence and sea level rise is assumed to be insignificant because the 1-percent exceedance flood elevations increase by “only” 0.3 to 0.7 feet (Engineering Appendix) with future subsidence and sea level rise. However this reasoning is not consistent with the statement in the GRR that “With the Clear Creek floodplain, a small increase in flood depth (i.e. less than 0.5 feet) can cause hundreds of additional structures to be inundated.”
- There is no discussion or consideration of uncertainty in the frequency and intensity of storms (particularly tropical storms) due to changing atmospheric conditions over the next 50 years.
- Life safety is not considered explicitly because, “Due to the flat topography of this watershed out of bank flooding does not rise suddenly (flash flooding) or have a high velocity that would endanger lives.” However, the GRR indicates that at least one death occurred and many residents had to be rescued due to flooding in 1979 from Tropical Storm Claudette, although it is not clear if these incidents occurred in the Clear Creek Watershed. In addition, whether or not the flooding happens quickly, there is still a potential for loss of human life because people do not evacuate, try to stay with their property, try to go back to check on their property, drive through high water, etc.

- The explanation for why the risk of release is negligible from the two Superfund sites due to extreme flooding is not detailed enough to justify the rationale.
- The existing risk of flooding compared with the residual risk of flooding with the Tentatively Recommended Plan in place are not communicated clearly in terms of flood depths and frequencies across the area or uncertainty in these estimates.
- The derivation of the stage-discharge uncertainty is not consistent across the appendices. The values used are reasonable, but the various appendices show differing values and methods.

Significance – High:

The GRR states that the evaluation and selection of the Tentatively Recommended Plan should “take into account a wide array of economic, environmental, technical and societal risk factors.” The justification for the Tentatively Recommended Plan is compromised if these factors are not considered and communicated adequately.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. A summary of information in the GRR about uncertainty in the economic costs and benefits, including standard deviations and percentiles.
2. A discussion of the uncertainty in estimated benefits in 2020 compared to estimated benefits in 2070.
3. Comparisons of model predictions with historical data.
 - a. A comparison of the estimate for the average annual damages with what has occurred historically
 - b. A comparison of the estimated flood levels and subsequent damages from Allison with observed flood levels and damages (accounting for any necessary adjustments so that similar conditions apply in the predictions and the observations).
4. An analysis, consistent with EC 1165-2-211 (USACE, 2009), showing the impact of uncertainty in regional subsidence and sea level rise on estimated economic damages.
5. Discussion about how uncertainty in the frequency and intensity of storms (particularly tropical storms) due to changing atmospheric conditions over the next 50 years would affect the various alternatives.
6. A discussion about how life safety risks are affected by the various alternatives, as well as uncertainty in life safety risks.
7. A more detailed explanation of why extreme flooding will not impact the Superfund sites, including information about location, topography and in situ containment measures.

8. Maps with the 10-percent, 1-percent and 0.2-percent annual exceedance probability flood plains and water depths in 2020 and 2070 for the Without Project and Recommended Plan conditions.
9. Consistent stage-discharge uncertainty values across all appendices.

Literature Cited:

USACE (2009). Water Resources Policies and Authorities: Incorporating Sea-Level Change Considerations in Civil Works Programs. Department of the Army, US Army Corps of Engineers, Washington, DC. Engineer Circular (EC) No. 1165-2-211. July 1.

Comment 4:

More detailed, specific discussion and reference to historic data related to geologic hazards, including slides and slumps, faulting, organic deposits, subsidence, factors of safety, and settlement should be provided.

Basis for Comment:

The GRR and Preliminary Draft Environmental Impact Statement (PDEIS) do not provide specific references for historical data to support the geologic and geotechnical assumptions. Additionally, the reports provide a limited discussion of geologic hazards including slope stability and settlement along Clear Creek and tributary alignments.

Geologic Hazards: Geologic hazards are discussed in general terms in the PDEIS but no specific locations of these hazards are identified. There are no specific discussions of the following geologic hazards:

- slides and slumps along the Clear Creek and its tributaries
- active or inactive faulting
- organic deposits

Historic Data: The supplemental documents do not provide specific reference to the geotechnical explorations that have been “performed along the Clear Creek floodplain over a number of decades.” The inclusion of historic data and information provides a basis for the need and extent of future design-level studies. Historic data will aid in supporting conclusions related to the presence of impacts and associated mitigation. The scope of this effort is envisioned as a paper study that documents all the available published data. This information would be included in the reports in the form of geologic maps and geologic cross sections that are developed using existing information. This effort will allow the identification of data gaps so that future geotechnical studies can focus the drilling of borings in areas where there is insufficient data.

General soils maps are provided, however no geologic mapping is provided. This information would guide the design-phase investigations. It would also assist in identifying geologic hazards that may impact the design and cost.

Slope Stability: The GRR states that “Analysis was performed for the undrained condition (end of construction) and for the drained condition (steady state).” The GRR provides design shear strength values for six soil types. However, documentation such as cross sections depicting soil profiles, slope inclinations, and groundwater conditions used in the slope stability analysis was not provided in the report.

No safety factors for various slopes and modeled conditions were provided. Additionally, the minimum factor of safety required for the slopes to be considered stable is not provided. Rather, the report simply states that the analysis indicates that the proposed slopes are stable. Table 4-1 requires additional explanation concerning peak versus residual and softened drained shear strengths, the effective normal stress ranges

for these design strengths, and confirmation that 5 degrees is what was intended as the drained friction angle for the slickened clay.

Settlement: There is no discussion of the estimated settlement associated with the placement of fill or regional subsidence. Discussion about the rates, depths and locations of settlement and regional subsidence would be helpful.

Significance – Medium:

The inclusion of historic data and information provides a basis for the need and extent of future design-level studies. An understanding of the potential geologic hazards that exist along the project alignment, with particular emphasis on slope stability and settlement, is necessary to evaluate the impact of these hazards and to develop the appropriate mitigation for the impact.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

Historic Data

1. Discussion of and reference to the reports that document the drillings and soil testing performed over a number of decades in the GRR.
2. Historic geologic maps of the floodplain area in the GRR.
3. Geologic mapping and the correlation of existing test borings in GRR and PDEIS.

Geologic Hazards

4. Specific soil profile information that includes soil types with depth and their corresponding index and strength data, for various sections along the creek alignment where cuts for detention are planned.
5. Documentation (cross sections depicting soil profiles, slope inclinations, and groundwater conditions) in the GRR that stability analysis was performed for steady state, rapid draw-down, and seismic conditions. This documentation should include a comparison of the calculated stability factors to the acceptable design safety factors.
6. Typical cross sections modeled and the results of the slope stability analysis that supports the conclusion that the design 4:1 slopes are stable.
7. Additional discussion about the rates, depths, and locations of regional subsidence as well as a discussion of the estimated settlement associated with the placement of fill.

Comment 5:
The proposed approach to establishing and maintaining benchmarks is not feasible because of regional subsidence.
Basis for Comment:
Benchmarks established by “deep-driven steel rods driven to refusal” are not resistant to regional subsidence if subsidence is occurring below the depth of the rod. A U.S. Geological Survey (USGS) Report for the Texas Water Development Board (USGS, 1975) indicates that 70 percent of subsidence is deeper than 400 feet below the ground surface. Therefore, using these rods alone and even tying these rods into other similarly established benchmarks in the area will likely not be sufficient.
Significance – Medium:
Design elevations and drainage slopes may not be achieved in construction without sufficient information regarding subsidence rates and how survey benchmark elevations will be maintained.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: <ol style="list-style-type: none"> 1. A description of the method used to tie local benchmarks into stable benchmarks located well outside of this region in order to establish absolute elevations. 2. Explanations for how potential subsidence over the duration of design and construction will be accommodated in establishing cut and fill grades and in estimating cut and fill volumes.

Literature cited:

USGS (1975). “Land-Surface Subsidence in the Houston-Galveston Region, Texas,” United States Geological Survey, Report 188.

Comment 6:

A comprehensive restoration plan needs to be developed and should describe how the restoration will be achieved, estimate project costs, and allow effective post-construction monitoring of project success.

Basis for Comment:

A very important aspect of this project is the restoration and/or recreation of wetland forests and riparian forest communities. This aspect is important in terms of project outcome as well as cost to the project.

Ecological restoration is an exceedingly complex task and one that requires considerable skill, foresight and planning. The Panel finds, however, that very little detail is provided in terms of strategy for how the restoration will be accomplished.

- There is some discussion on the planting of trees, but there is no reference to what kind of trees or what combination of trees will be planted.
- There is reference to “soil preparation,” but no details regarding what this involves have been provided.
- There are numerous references in the GRR and PDEIS to “restoring hydric conditions,” but there is no indication of how or where this will be accomplished.
- Additional important issues that should be addressed when considering restoration of wetlands but that are not discussed include what hydrological conditions must be established and how these conditions would be established.
- In cases where irrigation will be required to ensure survivability of new plantings, there is no indication of how the irrigation system will be set up or managed.

In addition to the very limited amount of information provided on how the restoration would be accomplished, there is little discussion of the challenges. Because of the limited amount of detail provided, there is the appearance that little thought or planning has gone into how the restoration would be accomplished or what the potential challenges would be in actually restoring these woodlands.

Significance – Medium:

A comprehensive and thoughtful restoration plan would strengthen the credibility of the project and aid in doing a more detailed and realistic costing of the restoration aspects of the project.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. A comprehensive restoration plan that provided details on soil preparation, topographic preparation, the type and source of soil material, and the species and

percent allocation of the trees to be planted.

2. For the zones where hydric conditions are going to be restored, a strategy for how this will be achieved and how a proper hydrologic condition for these forested wetlands will be established.
3. A more detailed cost estimate for restoration activities.

Comment 7:
The stability analysis section of the GRR should be expanded to address the use of “Setback Zones” near the top of slopes.
Basis for Comment:
Channel slopes and detention basins will be created by excavating soil. Slope failure or near surface shallow slumping may impact improvements such as roadways, buried utilities and structures that currently exist or will be constructed near the top of slopes. The response from the USACE during the original independent external peer review (IEPR) indicated that the stability analysis assumed that no surcharge loads will occur at the top of slopes and implied that the stability analysis included a “setback zone” from the top of the 4:1(H:V) slope. However, the stability analysis section of the revised GRR does not discuss this assumption, nor are specific recommendations provided to limit the placement of soils and other improvements near the top of slopes.
Significance –Medium
Inclusion of setback zones will reduce the potential for impacts to the new slopes and improvements from landslides, shallow slumping, and settlement, as well as provide land planning guidance.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: <ol style="list-style-type: none"> 1. A discussion that the stability analysis assumed that excavated soil and improvements will be “set back” a sufficient distance so as not to provide a surcharge loading to the creek slope. 2. A recommended “set-back” distance between the top of slope and possible improvements and stockpiled soil placement.

Comment 8:
Benefits from the second outlet should be included when considering induced damages.
Basis for Comment:
<p>Planning Constraint #6 states that “plans should cause no increase in flood surface elevations in downstream reaches.”</p> <ul style="list-style-type: none"> • Table 19 of the Economic Appendix indicates induced damages from the National Economic Development (NED) Plan, although statistically insignificant, may occur in Reaches 2 and 12. For Reaches 1-4, the Equivalent Annual Damages Without Project total \$472 million and are reduced by \$23 million, or about 5%. • On page 28 of the Economic Appendix, it is stated that the effect of the outlet is negligible, but it seems to have reduced damages in Reaches 1-4 from 4% of total in the previous draft to 2%. Damages are reduced by about half, and the Panel considers that to be significant. • The outlet is properly omitted from planning future steps, but consideration of induced damages should reflect the total project.
Significance – Medium:
The calculation of induced damages and the final display of benefits affect the understanding of the project benefits as a whole.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. Calculation and display of benefits and induced damages based on the total authorized project, including the second outlet and any eligible Section 575 features.

Comment 9:

The mitigation plan does not explicitly describe its elements and whether the goal of No Net Loss of wetlands would be accomplished.

Basis for Comment:

The elements and implementation of the mitigation plan are only generally described. The GRR (page 116) describes three elements making up the mitigation plan.

- 31 acres of floodplain forest restoration for a gain of 131 Average Annual Habitat Units (AAHUs)
- Preservation of 20 acres of floodplain forest
- Conversion of 37 acres of urban/pastureland to floodplain forest.

Credits in the form of AAHUs for the latter two elements are not described.

It is not clear if the Habitat Analysis Report includes consideration of the 20 acres of preservation and 37 acres of new floodplain forest because it only describes the 131 AAHUs gained by the 31 acres of floodplain forest restoration.

The PDEIS states on page 5-5 that “Impacts to wetlands must be fully mitigated, and projects must meet the goal of no net loss of wetland functions and values.” Section 5.1.1.2 of the PDEIS states that the 34.2 acres of wetland impact would be offset in-kind by the preservation/rehabilitation and reestablishment of floodplain forest in the avoidance and minimization features (presumably the 93.5 acres of preservation shown in Table 4.9-6) and the compensatory mitigation plan (the 31 acres of floodplain forest restoration for 131 AAHUs). The text states that the 31 acres of floodplain forest constitutes 27.2 acres of wetlands, but does not explain the basis for the calculation of the area of wetland habitat to be gained. It goes on to describe 7.5 acres of wetlands preserved, avoided, and rehabilitated to make a total of 34.7 wetland acres mitigated and no net loss, but it is unclear where the 7.5 acres of wetlands preserved, avoided, and rehabilitated are to be provided, and it is not described in comparison to the project impacts in Section 4.9.3.2.

With the lack of discussion in the PDEIS and habitat analysis, it is not clear if the additional mitigation elements described in the GRR (preservation of 20 acres of floodplain forest and conversion of 37 acres of urban/pastureland to floodplain forest) is intended to be implemented or is intended for consideration for mitigation. It is also unclear if or how any monitoring and mitigation management would be used to demonstrate achievement of the No Net Loss goal.

Significance – Medium:

Lack of detail regarding mitigation actions and monitoring limits understanding of how the goal of No Net Loss for the mitigation plan will be achieved.

Recommendation(s) for Resolution:

To resolve these concerns, the report would need to be expanded to include the following:

1. Clarification of what wetland mitigation measures would be taken to achieve No Net Loss of wetland habitat and if monitoring and management would be used to demonstrate achievement of the No Net Loss goal.

Comment 10:
The period for the Habitat Evaluation Procedures (HEP) projections is inconsistent with the referenced census tract population projections.
Basis for Comment:
<p>Page 32 of the GRR indicates that the period of analysis was modified from the years 2010 through 2060 to the years 2020 through 2070 and that all analyses were modified accordingly. Both the hydrologic analysis and the habitat assessment relied upon projections of future development through the period of analysis to determine potential effects under the Without Project condition.</p> <p>The results of the Habitat Assessment Report refer to the baseline condition (year 2000) and the revised analysis period of 2020 to 2070, but refer to the census tract population projections from years 2010 and 2060 (on page 73) to estimate weighted future urban development conditions. Similarly, the Hydrologic Analysis – Without Project Conditions Report refers to assessing damages for a 50-year period between 2010 and 2060 (on page 1) and describes the method and assumptions made to determine 2010-2060 levels of development (on page 11).</p> <p>The supporting analyses were modified to the 2020-2070 period, but the documentation does not reflect that modification consistently throughout the GRR. The supporting models still appear to be based on 2010-2060 development projections, but the supporting documentation does not include discussion of how the 2010-2060 forecasts remain appropriate representations of the future Without Project condition over the 2020-2070 period.</p>
Significance – Low:
Consistency between the main and supporting documents supports the technical quality of the documentation.
Recommendation(s) for Resolution:
<p>To resolve these concerns, the report would need to be expanded to include the following:</p> <ol style="list-style-type: none"> 1. Consistency in assumptions. 2. Consistency between development projections and analyses throughout the GRR, PDEIS, and supporting documentation.

Comment 11:
There appears to be inconsistency between the GRR and PDEIS in the reporting of forest floodplain impacts.
Basis for Comment:
The habitat analysis (page 103 of Appendix B of the GRR) shows a project impact of 106 AAHUs replaced with 131 AAHUs for a net gain of 25 AAHUs. Table 4.9-5 of the PDEIS shows the same values. However, The Executive Summary of the PDEIS describes a loss of 100 AAHUs (page xi) and a gain of 146 AAHUs (page xv) for cumulative project benefits of 46 AAHUs; and page 114 of the GRR states 56 AAHUs of forest floodplain impacts.
Significance – Low:
Consistency within and between documents supports the technical quality of the documentation.
Recommendation(s) for Resolution:
To resolve these concerns, the reports would need to be expanded to include the following: <ol style="list-style-type: none"> 1. Consistent and accurate descriptions of project impacts and mitigation between documents.

Comment 12:
Areas that require erosion protection should be identified to aid in developing preliminary construction costs associated with providing erosion protection.
Basis for Comment:
The geotechnical section of the GRR notes that erosion protection will be required where flow velocities exceed 6 feet per second (fps). The GRR does not identify the areas where flow velocities will exceed this threshold. Considerable hydraulic modeling has been performed that provides preliminary estimates of flow velocities and elevations along Clear Creek and its tributaries. This will allow the identification of reaches where the velocities exceed the critical velocity of 6 fps. Preliminary costs for Articulate Concrete Blocks, Turf Reinforcement Mats, Rip Rap, or other methods could be established.
Significance – Low:
Inclusion of additional discussion regarding where erosion protection is required will help with defining project impacts and costs.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include: <ol style="list-style-type: none"> 1. Identification of reaches where flow velocities exceed 6 fps. 2. Description of the appropriate erosion protection. 3. Associated anticipated construction costs for areas where flow velocities exceed 6 fps. 4. As an alternative to recommendation 3, calculations to show that the costs of protection are low enough in relation to the entire project that they can be included under construction contingencies.

Comment 13:
A stronger justification needs to be provided for the final selection of the 18 variables that make up the Floodplain Forest Community Index Model.
Basis for Comment:
The rationale, description, and application of the habitat community modeling have been significantly improved, and most of the Panel’s concerns relative to the habitat community modeling have been addressed. However, the document would benefit with additional justification as to why this combination of 18 variables is the best or makes the most sense.
Significance – Low:
The technical quality of the report will be improved by providing some additional rationale and/or justification for the final selection of the variables in the Forest Community Index Model.
Recommendation(s) for Resolution:
To resolve these concerns, the report would need to be expanded to include the following: <ul style="list-style-type: none"> 1. Additional details in Appendix B of the PDEIS (around page 43) to justify the final selection of the 18 variables in the Floodplain Forest Community Index Model. The justification should explain the collective judgment of the E team that this combination of variables was superior to other possible combinations. The justification should include: <ul style="list-style-type: none"> a. Why the parameters included in the model were selected over others. b. What other parameters were considered. c. Whether and how other combinations of parameters were evaluated.

APPENDIX B

Final Charge to the Independent External Peer Review Panel

for the

**Clear Creek, Texas Flood Risk Management General Reevaluation Report and
Preliminary Draft Environmental Impact Statement Follow-up IEPR**

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**Final Charge Guidance and Questions to the Peer Review Panel
for the
Clear Creek, Texas Flood Risk Management Project
General Reevaluation Report and Preliminary Draft
Environmental Impact Statement Follow-up IEPR**

BACKGROUND

The U.S. Army Corps of Engineers (USACE) has been directed by Congress to develop the Clear Creek General Re-Evaluation Report (GRR). Clear Creek drains an area south of and partially within the city of Houston, Texas. The Clear Creek watershed is located in four counties, includes 16 cities, and covers approximately 260 square miles of land. The watershed is composed of relatively flat coastal plain with elevations varying from near sea level at Clear Lake on the eastern edge of the watershed to about 75 feet above mean sea level (MSL) on the western watershed boundary. Clear Creek receives flow from 17 principal tributaries. The Clear Creek watershed 1 percent (100-year) annual exceedance probability (AEP) floodplain contains an area of approximately 19,000 acres. Many communities and subdivisions along the creek are subject to flooding and recent floods (1973, 1976, twice in 1979, 1989, October 1994, and June 2001) have caused extensive property damage.

The Flood Control Act of 1962 authorized the initial investigation of flood problems on Clear Creek. In 1968 Congress authorized the Clear Creek Flood Control project consisting of an improved grass-lined channel 31 miles long that would replace about 41 miles of existing winding channel. This channel was designed to contain flood flows up to and including the 1 percent (100-year) AEP flood event. Subsequent Congressional actions, administrative changes to water resources planning policies, changes in the project area, and changes in the attitude of the affected public, required a comprehensive restudy of the Clear Creek project.

A restudy was initiated in the early 1970s. In 1982 a modified project was recommended that changed the previous 1 percent (100-year) AEP flood event level of protection in the 1968 authorization to a 10 percent (10-year) AEP flood event level. The new plan required less channel modification and included nonstructural measures. Construction began in the mid-1990s. Subsequently public concerns about potential environmental and hydraulic impacts led the project sponsors to request that construction be suspended. The Harris County Flood Control District developed a Sponsor Proposed Alternative (SPA) that is substantially different from the authorized project. Therefore, Galveston District initiated a general reevaluation study in 1999 to determine a technically effective and publicly acceptable solution to reducing flood risk in the watershed.

The Clear Creek GRR provides the details of the planning, engineering, and environmental objectives and assessment methods for evaluating the flood risk management projects proposed for the Clear Creek watershed. The Clear Creek GRR scope was to prepare a decision document that identifies and evaluates several plans for reducing flood risk; enhancing fish and wildlife resources; improving water quality; preserving, protecting and restoring natural and cultural resources; and attaining the ecosystem benefits that Congress intended in a cost effective manner. The Clear Creek GRR culminates in a recommended plan.

An environmental impact statement (EIS) is being prepared in compliance with the National Environmental Policy Act (NEPA) (40 CFR § 1500-1508) to evaluate the potential environmental impacts of the proposed actions and reasonable alternatives to those actions. A Preliminary Draft EIS (PDEIS) has already been completed.

In compliance with WRDA 2034 (Public Law 110-114), Section 2034, and because of the importance of this project, an independent external peer review (IEPR) of the Clear Creek GRR and PDEIS was conducted in 2009. The GRR and PDEIS have been revised to reflect the comments of the IEPR Panel, as well as comments made during subsequent USACE reviews. To insure transparency and maximize effectiveness of the review process, a follow-up IEPR (this project) is being conducted to determine how well the initial IEPR comments have been incorporated into the updated project report in light of the subsequent USACE reviews.

OBJECTIVES

The objective of this work is to conduct follow-up IEPR of the Revised Clear Creek, Texas General Reevaluation Report and Preliminary Draft Environmental Impact Statement (Clear Creek GRR and PDEIS) in accordance with the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010 and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

This general purpose of this IEPR is to assess the adequacy and acceptability of economic, engineering, and environmental methods, models, and analyses used for the Clear Creek GRR and PDEIS. The specific purpose of the follow-up IEPR is to assess the adequacy and technical basis of the revisions that have been made to the Clear Creek GRR and PDEIS based on comments from the original review and to determine whether any additional issues have been created by the revisions made. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in engineering, economics, and environmental issues relevant to the project. They should also have experience applying their subject matter expertise to flood risk management.

The panel members will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-209, Appendix D, reviews should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions

based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The Panel may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents and reference materials, along with file names, that are being provided to the Panel for the review. **The documents and files presented in bold font are those which are to be reviewed.** All other documents are provided for reference.

USACE will provide the following documents and supplemental information for review:

- **Clear Creek, Texas Flood Risk Management General Reevaluation Report** (May 17, 2010 revision), including figures and appendices. Files provided include:
 - 1 – Clear Creek GRR 5-17-10.pdf
 - Clear Creek GRR Figure 3.pdf
 - Clear Creek GRR Figure 4.pdf
 - Clear Creek GRR Figure 5.pdf
 - Clear Creek GRR Figure 12.pdf
 - Clear Creek GRR Figure 13.pdf
 - 4 – Clear Creek GRR Appendix A – Section 575 Implementation.pdf
 - 5 – Clear Creek GRR Economic_Appendix 5-17-10.pdf
 - 6 – Clear Creek GRR Appendix C WOPC.pdf
 - 8 – Clear Creek GRR Appendix E – Preliminary Screening.pdf
 - 9 – Clear Creek GRR Appendix F First Added Notebook.pdf
 - 10 – Clear Creek GRR REP 17 May 10.pdf
 - 13 – Clear Creek Combined EngrAppendix as of May 2010.pdf
- **Revised Environmental Impact Statement for the Clear Creek General Reevaluation Study.** Files provided include:
 - 2 – May Volume 1 Clear Creek_EIS_20100527.pdf (EIS)
 - 3 – May Volume 2 Clear Creek Appendices_20100527.pdf (EIS)

USACE responses to review comments will also be provided for review (file name 12 – IEPR Compliance Document 5-17-2010.pdf).

Final Panel Comments from the original IEPR are being provided for review so that panel members can reference the basis for each of the comments and recommendations for resolution.

In addition, the report for the Clear Creek Community Models and related spreadsheets are being provided for background, but not for review. These files include:

- 7 - 5-28-10 Clear Creek Final Model Report from ERDC.pdf
- CC rounding - 1.xls
- CC rounding - 2.xls
- CC_Sensitivity Analysis_revised.xls
- CC_Verification_revised.xls
- Clear Creek Model Cert_IEPR_kac.xls (response to comments)

Finally, the following USACE guidance is being provided for reference:

- USACE guidance *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010
- Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004.

SCHEDULE

TASK	ACTION	DUE DATE
Conduct Peer Review	Review documents sent to panel members	6/14/2010
	Battelle/Panel Kick-off Meeting	6/15/2010
	USACE/Battelle/Panel Kick-off Meeting	6/15/2010
	Panel members complete their individual reviews	6/29/2010
Prepare Final Panel Comments and Final IEPR Report	Battelle provides Panel merged individual comments and talking points for Panel review teleconference	7/1/2010
	Convene Panel review teleconference	7/2/2010
	Battelle provides Final Panel Comments directive to Panel	7/6/2010
	Panel members provide draft Final Panel Comments to Battelle	7/12/2010
	Battelle provides feedback to Panel on draft Final Panel Comments; Panel provides revised draft Final Panel Comments per Battelle feedback	Not Applicable
	Final Panel Comments finalized	7/15/2010
	Battelle provides Final IEPR Report to Panel for review	7/19/2010
	Panel provides comments on Final IEPR Report	7/20/2010
	*Battelle submits Final IEPR Report to USACE	7/23/2010
Comment/Response Process	Battelle inputs Final Panel Comments to DrChecks and provides response template to USACE	7/27/2010
	USACE PDT provides draft Evaluator responses and clarifying questions to Battelle	7/30/2010
	Battelle provides the Panel the draft Evaluator responses and clarifying questions	8/2/2010
	Panel members provide Battelle with draft comments on draft Evaluator responses (i.e., draft BackCheck responses)	8/5/2010
	Teleconference with Battelle and Panel to discuss draft BackCheck responses	8/5/2010
	Teleconference between Battelle, Panel, and USACE PDT to discuss Final Panel Comments, draft responses and clarifying questions	8/6/2010
	USACE inputs final Evaluator responses in DrChecks	8/13/2010
	Battelle provides Evaluator responses to Panel	8/16/2010
	Panel members provide Battelle with BackCheck responses	8/19/2010
	Battelle inputs BackCheck responses in DrChecks	8/19/2010
	*Battelle submits pdf printout of DrChecks project file	8/20/2010

Note: Deliverables are noted with an asterisk (*).

CHARGE FOR PEER REVIEW

Members of this peer review panel are asked to determine whether Final Panel Comments from the original IEPR of the Clear Creek GRR and PDEIS have been adequately addressed. They are also asked to determine whether revisions to the documents based on comments from the original IEPR have resulted in any additional issues that may affect the credibility of the technical approach or scientific rationale presented in the Clear Creek GRR and PDEIS and/or the validity of conclusions based on the analyses. The Panel is being asked to provide feedback on the economic, engineering, environmental resources, and plan formulation. The panel members are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the Panel are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Clear Creek GRR and PDEIS. Please focus on your areas of expertise and technical knowledge. Also focus on the specific charge questions that you developed or contributed to for the original IEPR. In addition, please note the following guidance. Note that the Panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-209; Appendix D). **For the revisions that have been made:**

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluation of economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable.
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making. Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
2. Please contact the Battelle deputy project manager (Amanda Maxemchuk, MaxemchukA@battelle.org) or project manager (Karen Johnson-Young, Johnson-YoungK@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle project manager immediately.
4. Your name will appear as one of the panelists in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Amanda Maxemchuk, MaxemchukA@battelle.org, no later than June 29, 2010, 10 pm EDT.

**Follow-up Independent External Peer Review of the
Revised Clear Creek, Texas Flood Risk Management Project General Reevaluation Report
and Preliminary Draft Environmental Impact Statement**

Final Charge Questions

Final Panel Comments developed for the original IEPR are being provided for this review. For each of the Final Panel Comment Statements below, please address the following questions:

- a) Were your comments adequately addressed in the Revised Clear Creek GRR and PDEIS?
- b) If your comments were not adequately addressed, please explain why and what issues remain.
- c) Are there any additional issues that have developed as a result of revisions made to address comments on the Draft GRR and PDEIS?

Please respond to these three questions for each Final Panel Comment for which you were either the lead or contributing author. Brad Wilcox will respond in place of Evan Seimann. Please respond to these questions in the charge response form provided. The following table contains the Final Panel Comments from the original IEPR. The lead and contributing authors are identified to indicate which reviewers will need to address the questions above.

Comment #	Final Panel Comment Statement	Authors (lead author first)
1	Section 575 guidance of the Water Resources Development Act (WRDA) of 1996 requires four distinct steps for an evaluation of economic benefits and costs for projects and these steps are not followed for the Clear Creek GRR.	Mantey, Henry
2	Information in the Economic Evaluation needs to be updated and rely less on appraisals from October 2005 price levels.	Mantey, Seimann
3	The rationale provided for developing and comparing alternatives is not complete. Public health and safety, life cycle factors, and risk and uncertainty have not been comprehensively considered or adequately communicated.	Gilbert, Mantey
4	The habitat model has fundamental deficiencies in many areas.	Seimann, Henry
5	The Purpose and Need should clearly describe how past rain events that have resulted in flooding compare with more recent rain events and explain how flooding is likely to increase. It should also include information about how this system has and will interact with hurricane storm surges.	Henry
6	The Formulation Objectives, Constraints, and	Mantey

Comment #	Final Panel Comment Statement	Authors (lead author first)
	Criteria of the GRR should explain why only NED is used for decision making in this study and refer readers to the EIS for the RED, EQ, and OSE accounts.	
7	The rationale for excluding the second outlet from the Without-Project conditions should be clarified.	Mantey
8	Without-Project conditions should cover the period from 2000 to 2070.	Mantey
9	It is unclear if the methodology used to estimate flood damages includes damages from the 1-year event.	Mantey, Freeman
10	The future conditions assumptions for HEC-1 models appear to be inconsistent with those used for the HEP analysis.	Henry, Freeman
11	Clearing and Snagging has the highest rate of return, yet it is dismissed as the first added alternative and never seems to receive any further study.	Henry
12	The assumption that increased runoff will result from development needs to be justified to make sure that it is consistent with floodplain regulations and in compliance with federal law.	Mantey, Seimann, Freeman
13	The potential geological hazards associated with the Beaumont Clay Formation underlying this region (e.g., sinkholes, salt domes, active faults, subsidence, expansive clays, organic soils, etc.), including the stability of cut slopes, need to be considered and discussed in the report regarding how they may impact the project.	Bruggers, Gilbert
14	It is unclear what percentage of impacted landcover categories is wetland, and the area of affected wetland should be more accurately defined to compare to mitigation plans and ensure no net loss.	Henry, Seimann
15	The impacts from the connected action of relocating pipelines should be included in the analysis.	Henry, Bruggers
16	There needs to be additional discussion and reference to specific historic data to support the geotechnical design assumptions.	Bruggers
17	Please clarify how benchmarks for survey elevations will be established and maintained over the estimated 10-year construction schedule, given regional subsidence.	Gilbert, Bruggers

Comment #	Final Panel Comment Statement	Authors (lead author first)
18	The restoration and management plan currently being proposed may not be feasible.	Seimann, Henry
19	The explanation in the Appendix regarding the shift from 2010–2060 to 2020–2070 needs to be discussed in the main text.	Freeman
20	A comparison between new models and old models should be included, as well as a discussion of why the modeling was updated.	Henry, Freeman
21	The GRR should clearly identify that the channel and detention basin slopes will be globally stable but may be subject to shallow slides periodically that will require long-term maintenance.	Gilbert
22	The erosion threshold of 6 fps needs to be documented.	Freeman
23	The implementation of “Setback Zones” for structural improvement near the tops of slopes and areas that receive sediment and soil from detention excavations should be considered.	Bruggers
24	The discussion of contributions to the Clear Creek watershed would benefit from a figure that demonstrates the difference in the extent of the 100-year or other floodplain areas.	Henry, Freeman
25	The Purpose and Need should include the physical characteristics of the watershed that contribute to flooding problems as well as quantification of the costs of flood damage.	Freeman
26	Best Management Practices that would be employed to mitigate construction impacts to water quality, sediment quality, air quality and noise impacts should be addressed.	Henry, Bruggers
27	The interest cost and benefits from the completed features should be calculated for each year during the construction period.	Mantey

ATTACHMENT A

Sample of Value Improvement Calculation for Mud Gully

for the

**Clear Creek, Texas Flood Risk Management General Reevaluation Report and
Preliminary Draft Environmental Impact Statement Follow-up IEPR**

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Attachment A - Mud Gully Value Improvements

Tax ID Code	2001	2009	Ratio	2010	Ratio
TAX ID 1059070000010PID	\$ 76.20	\$ 98.62	1.29	\$ 98.62	1.29
TAX ID 1144170010009PID	\$ 56.50	\$ 80.89	1.43	\$ 80.89	1.43
TAX ID 1055710000016PID	\$ 75.50	\$ 79.30	1.05	\$ 79.30	1.05
TAX ID 0985170000017PID	\$ 85.00	\$ 102.41	1.20	\$ 102.41	1.20
TAX ID 1001420000005PID	\$ 63.30	\$ 80.72	1.28	\$ 80.72	1.28
TAX ID 1143820380037PID	\$ 110.10	\$ 135.75	1.23	\$ 135.75	1.23
TAX ID 1126870000003PID	\$ 47.90	\$ 45.61	0.95	\$ 45.61	0.95
TAX ID 1144200050187PID	\$ 68.10	\$ 90.28	1.33	\$ 90.28	1.33
TAX ID 1163360020020PID	\$ 116.50	\$ 143.97	1.24	\$ 143.97	1.24
TAX ID 0941220000018PID	\$ 64.50	\$ 99.03	1.54	\$ 99.03	1.54
TAX ID 1149910040013PID	\$ 57.00	\$ 85.00	1.49	\$ 78.20	1.37
TAX ID 1149910020011PID	\$ 58.50	\$ 91.39	1.56	\$ 83.17	1.42
TAX ID 1116340000036PID	\$ 52.10	\$ 61.13	1.17	\$ 61.13	1.17
TAX ID 1076130000018PID	\$ 85.10	\$ 99.34	1.17	\$ 99.34	1.17
TAX ID 1144200010003PID	\$ 55.50	\$ 75.17	1.35	\$ 75.17	1.35
TAX ID 1149910020003PID	\$ 52.80	\$ 77.65	1.47	\$ 69.68	1.32
TAX ID 1116660000001PID	\$ 69.20	\$ 105.30	1.52	\$ 92.91	1.34
TAX ID 1059040000076PID	\$ 59.60	\$ 68.05	1.14	\$ 81.76	1.37
TAX ID 1154720050019PID	\$ 57.50	\$ 87.37	1.52	\$ 81.02	1.41
TAX ID 1069700000012PID	\$ 74.30	\$ 101.96	1.37	\$ 101.96	1.37
TAX ID 1050380000003PID	\$ 64.10	\$ 105.99	1.65	\$ 101.43	1.58
TAX ID 0834550000005PID	\$ 38.50	\$ 67.51	1.75	\$ 58.05	1.51
TAX ID 1144170020030PID	\$ 63.50	\$ 87.51	1.38	\$ 87.51	1.38
TAX ID 1067070000009PID	\$ 77.80	\$ 76.76	0.99	\$ 76.76	0.99
TAX ID 1003590000022PID	\$ 61.20	\$ 86.24	1.41	Pending	
TAX ID 0941280000006PID	\$ 57.70	\$ 85.08	1.47	\$ 85.08	1.47
TAX ID 1106830000009PID	\$ 57.60	\$ 80.69	1.40	\$ 87.65	1.52
TAX ID 1010690000017PID	\$ 74.20	\$ 89.74	1.21	\$ 89.74	1.21
TAX ID 1000200000029PID	\$ 67.40	\$ 90.80	1.35	\$ 87.65	1.30
TAX ID 1059050000022PID	\$ 74.10	\$ 93.07	1.26	\$ 93.07	1.26
TAX ID 1116390000010PID	\$ 76.50	\$ 78.85	1.03	\$ 78.85	1.03
TAX ID 1050380000033PID	\$ 60.40	\$ 86.83	1.44	\$ 74.98	1.24
TAX ID 1076140000027PID	\$ 61.00	\$ 94.09	1.54	\$ 86.27	1.41
TAX ID 1003670000009PID	\$ 69.20	\$ 93.39	1.35	\$ 90.25	1.30
TAX ID 1050370000017PID	\$ 90.00	\$ 95.34	1.06	Pending	
TAX ID 0966240000004PID	\$ 49.00	\$ 66.25	1.35	\$ 66.25	1.35
TAX ID 1116410000016PID	\$ 76.20	\$ 81.20	1.07	\$ 81.20	1.07
TAX ID 1010660000009PID	\$ 70.20	\$ 93.24	1.33	\$ 93.24	1.33
TAX ID 1076120000010PID	\$ 56.10	\$ 105.17	1.87	\$ 105.17	1.87
TAX ID 1015250000004PID	\$ 71.90	\$ 102.61	1.43	\$ 99.21	1.38
TAX ID 0941210000004PID	\$ 52.30	\$ 81.24	1.55	\$ 81.24	1.55
TAX ID 0941250000019PID	\$ 55.50	\$ 82.55	1.49	\$ 82.55	1.49
TAX ID 1143820380005PID	\$ 92.20	\$ 123.46	1.34	\$ 123.46	1.34
TAX ID 1076130000003PID	\$ 62.70	\$ 98.36	1.57	\$ 90.13	1.44
TAX ID 1126860000024PID	\$ 69.40	\$ 97.83	1.41	\$ 95.79	1.38
TAX ID 1126870000008PID	\$ 46.20	\$ 51.64	1.12	\$ 51.64	1.12
TAX ID 1000220000005PID	\$ 67.20	\$ 90.92	1.35	\$ 87.95	1.31
TAX ID 1050410000004PID	\$ 47.50	\$ 55.80	1.17	\$ 47.30	1.00
TAX ID 1116380000006PID	\$ 69.50	\$ 81.47	1.17	\$ 81.47	1.17
TAX ID 1059040000072PID	\$ 55.70	\$ 77.23	1.39	\$ 77.23	1.39

Tax ID Code	2001	2009	Ratio	2010	Ratio
		mean	1.34	mean	1.32
		median	1.35	median	1.33
		low	0.95	low	0.95
		high	1.87	high	1.87

Comment Report: All Comments

Project: Clear Creek Follow-Up IEPR Prior to FRC

Review: Follow-Up IEPR

Displaying 13 comments for the criteria specified in this report.

469 ms to run this page

Id	Discipline	Section/Figure	Page Number	Line Number
3409785	Planning - Plan Formulation	n/a'	Comment 1	n/a
(Document Reference: Significance - High)				
Justification for why Section 575 covers the Mary's Creek detention basin and why it is not included in the Without Project condition needs to be provided.				
(Attachment: Clear Creek Comment 1.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
Revised 23-Jul-10.				
1-0	Evaluation Concurred Concur 1. Adopt. The GRR currently details how Section 575 was amended by Section 354 of WRDA 1999 to include Clear Creek. The Economic Appendix will be modified to clarify this authority as well. 2. Adopt. The GRR will be modified to clarify that the current with-project analysis is the "total project output". The detention on Mary's Creek which are included in the 575 analysis will be further evaluated at a 100% level. This level will be interpolated from the existing 75% and 200% levels that were previously evaluated. 3. Adopt. To complete Step 4 of the 575 implementation guidance, USACE will interpolate different components of the Mary's Creek modifications. If the channel portion is not cost effective it will be evaluated further. 4. Adopt. The GRR will be modified to clarify which features were included in 575 analysis. Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10			
1-1	Backcheck Recommendation Close Comment Concur. As the entire project was optimized before adding the Section 575 detention on Mary's Creek, there is no reason to expect a benefit-cost ratio greater than unity for the channel portion on that stream or elsewhere within the study area. The goal is to obtain the total project output as efficiently as reasonably possible. Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10			
Current Comment Status: Comment Closed				
3409795	Economics	n/a'	Comment 2	n/a
(Document Reference: Significance - High)				
The values used in the Economic Evaluation need to be updated directly from 2001 values to current values.				
(Attachment: Clear Creek Comment 2.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Non-concurred Non-Concur 1. Adopt. The current price level (FY10) was updated directly from 2001 to current prices. This is included in the analysis in the draft report currently. 2. Not Adopt. The comment stems from a concern about the comparison of appraisal district values and values used in the analysis as well as the values used for comparison purposes in the report. The 2005 appraisals were not utilized in the final valuation of structures, only used for comparison with the FY07 and FY09 price level updates. The results of each update (Oct 2005, 2007 and 2009) show that these three independent valuations arrived at reasonable and nearly identical results. The cap and homestead value limitations are only part of the potential issues with tax assessor values. Tax assessor valuations are subject to arbitrary limits from year-to-year, based upon political pressure from school districts, property owners' (disputes when values are raised), as well as various political interests. In addition, years of experience with Texas appraisal district data reveal that the quality of the data can be in question – with missing values, zero-value structures, missing structures, etc. The appraisal district data can be a good starting point for developing a HEC-			

		FDA structure database, but the data must always be revised and updated in order to meet the requirements for COE economic analysis purposes. Most COE districts develop independent valuation of structures. For these reasons, independent valuations were made, which are more reliable and based on actual structure surveys, photos, square footage, building characteristics, quality of the construction and depreciation.		
		Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10		
1-1	Backcheck Recommendation Close Comment	Non-Concur. There was a misunderstanding when the Panel interpreted the draft report. Please review the attached file for the complete Panel Backcheck		
		Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10 (Attachment: Clear Creek Comment 2 Backcheck Response.doc)		
		Current Comment Status: Comment Closed		
3409799	Planning - Plan Formulation	n/a'	Comment 3	n/a
(Document Reference: Significance - High)				
Risk and uncertainty have not been fully implemented in evaluating and formulating alternatives.				
(Attachment: Clear Creek Comment 3.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Concurred	Modifications will be made to the report to address the comments. Please see the attached form for specifics.		
		Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10 (Attachment: Clear Creek Comment 3 USACE Response.docx)		
1-1	Backcheck Recommendation Close Comment	Concur.		
		Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10		
		Current Comment Status: Comment Closed		
3409803	Environmental	n/a'	Comment 4	n/a
(Document Reference: Significance - Medium)				
More detailed, specific discussion and reference to historic data related to geologic hazards, including slides and slumps, faulting, organic deposits, subsidence, factors of safety, and settlement should be provided.				
(Attachment: Clear Creek Comment 4.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
Revised 23-Jul-10.				
1-0	Evaluation Concurred	The Engineering Appendix will be modified to address the comment. Please see the attached file for details.		
		Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10 (Attachment: Clear Creek Comment 4 USACE Response.docx)		
1-1	Backcheck Recommendation Close Comment	Concur.		
		Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10		
		Current Comment Status: Comment Closed		
3409807	Construction Management	n/a'	Comment 5	n/a

(Document Reference: [Significance - Medium](#))

The proposed approach to establishing and maintaining benchmarks is not feasible because of regional subsidence.

(Attachment: [Clear_Creek_Comment_5.docx](#))

Submitted By: [Meghan O'Connor](#) (561-656-6300). Submitted On: 23-Jul-10

1-0	Evaluation Concurred Concur. 1. Adopt. The Engineering Appendix will be modified to better explain how the project will resolve benchmark locations. TXDOT has established stable benchmarks throughout the region and one possibility is to tie into these as reference points. This will be better defined during the PED phase. 2. Adopt. Additional analysis will be included in the report on the potential impact of subsidence on project design and maintenance. Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10
1-1	Backcheck Recommendation Close Comment Concur. Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10
	Current Comment Status: Comment Closed

3409814	Biology-Ecology	n/a'	Comment 6	n/a
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(Document Reference: [Significance - Medium](#))

A comprehensive restoration plan needs to be developed and should describe how the restoration will be achieved, estimate project costs, and allow effective post-construction monitoring of project success.

(Attachment: [Clear_Creek_Comment_6.docx](#))

Submitted By: [Meghan O'Connor](#) (561-656-6300). Submitted On: 23-Jul-10

1-0	Evaluation Concurred Concur. 1. Adopt. USACE will clarify what steps will be taken in the restoration and mitigation areas to ensure that the sites are successfully restored. Also will include information on monitoring and adaptive management. Most detail will be included in the design portion, but additional information will be provided in the EIS along with a support demonstrating that USACE is confident the effort will be successful. 2. Adopt. USACE will clarify what steps will be taken in the restoration and mitigation areas to ensure that the sites are successfully restored. Also will include information on monitoring and adaptive management. Most detail will be included in the design portion, but additional information will be provided in the EIS along with a support demonstrating that USACE is confident the effort will be successful. 3. Not Adopt. The current cost estimate takes into consideration many of the steps that will be better described in the GRR and EIS. Based on this, for the feasibility level of this study, no additional details will be included on the restoration efforts. Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10
1-1	Backcheck Recommendation Close Comment Concur. Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10
	Current Comment Status: Comment Closed

3409820	Geotechnical	n/a'	Comment 7	n/a
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(Document Reference: [Significance - Medium](#))

The stability analysis section of the GRR should be expanded to address the use of "Setback Zones" near the top of slopes.

(Attachment: [Clear_Creek_Comment_7.docx](#))

Submitted By: [Meghan O'Connor](#) (561-656-6300). Submitted On: 23-Jul-10

1-0	Evaluation Concurred Concur. 1. Adopt. The current plan is to transport the excavated materials to a placement area outside of the project area. The Engineering Appendix will be clarified to explain that soil and improvements will be "set back" a sufficient distance. 2. Adopt. This set-back has already been established and will be better explained in the Engineering Appendix. Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10			
1-1	Backcheck Recommendation Close Comment Concur. Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10			
Current Comment Status: Comment Closed				
3409825	General	n/a'	Comment 8	n/a
(Document Reference: Significance - Medium)				
Benefits from the second outlet should be included when considering induced damages.				
(Attachment: Clear Creek Comment 8.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Concurred Concur. 1. Adopt. The recommended plan analysis results and the induced damages include the effect of the second outlet and eligible Section 575 features. The benefits and induced damages are displayed in the Recommended Plan section and quantified in Tables 19 through 24 of the economic appendix. The Section 575 section of the appendix quantifies the effect of removal of the Section 575 features from the analysis. This information will be clarified in the Economic Appendix. Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10			
1-1	Backcheck Recommendation Close Comment Concur. Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10			
Current Comment Status: Comment Closed				
3409834	Biology-Ecology	n/a'	Comment 9	n/a
(Document Reference: Significance - Medium)				
The mitigation plan does not explicitly describe its elements and whether the goal of No Net Loss of wetlands would be accomplished.				
(Attachment: Clear Creek Comment 9.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Concurred Concur. The comment pertains to a section of the GRR that describes a restoration area (i.e. the preservation of 20 acres of floodplain forest and conversion of 37 acres of urban/pastureland to floodplain forest) that is not part of the recommended plan and its associated mitigation. The section is not included in the SEIS and will be deleted from the GRR. 1. Adopt. USACE will state what steps will be taken for adaptive management. USACE will also describe where the 7.5 acres of wetlands preserved is located and how that accomplishes No Net Loss. For clarification purposes the 7.5 acres of preservation is located in the footprint of the low flow channel that will be preserved in areas where habitat currently exists and improved in areas where habitat is minimal. Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10			
1-1	Backcheck Recommendation Close Comment Concur.			

	Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10			
	Current Comment Status: Comment Closed			
3409840	General	n/a'	Comment 10	n/a
(Document Reference: Significance - Low)				
The period for the Habitat Evaluation Procedures (HEP) projections is inconsistent with the referenced census tract population projections.				
(Attachment: Clear Creek Comment 10.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Concurred Concur. 1. Adopt. The GRR and supporting documents will be modified to better describe the steps taken to modify the period of analysis from 2010 to 2020 to insure that steps are better described. 2. Adopt. The GRR and supporting documents will be modified to better describe the steps taken to modify the period of analysis from 2010 to 2020 to insure that steps are better described.			
	Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10			
1-1	Backcheck Recommendation Close Comment Concur.			
	Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10			
	Current Comment Status: Comment Closed			
3409847	Natural Resources	n/a'	Comment 11	n/a
(Document Reference: Significance - Low)				
There appears to be inconsistency between the GRR and PDEIS in the reporting of forest floodplain impacts.				
(Attachment: Clear Creek Comment 11.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Concurred Concur. 1. Adopt. The GRR and PDEIS will be scrubbed to insure consistency in the information provided.			
	Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10			
1-1	Backcheck Recommendation Close Comment Concur.			
	Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10			
	Current Comment Status: Comment Closed			
3409854	Construction Management	n/a'	Comment 12	n/a
(Document Reference: Significance - Low)				
Areas that require erosion protection should be identified to aid in developing preliminary construction costs associated with providing erosion protection.				
(Attachment: Clear Creek Comment 12.docx)				
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10				
1-0	Evaluation Concurred Concur. 1. Adopt. A map detailing areas where flows are expected to exceed 6 fps will be added to the Engineering Appendix. 2. Adopt. A general description of expected types of erosion protection to be used will be added to the Engineering Appendix. 3. Not Adopt. Costs currently included in the report include sufficient levels of contingency			

		to capture any costs that would be associated with erosion protection. 4. Not Adopt. Feasibility level analysis is performed with sufficient levels of contingency that allow the team to capture the expected costs of constructing erosion protection.
		Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10
1 -1		Backcheck Recommendation Close Comment Concur.
		Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10
		Current Comment Status: Comment Closed
3409862	Biology-Ecology	n/a'
		Comment 13
		n/a
(Document Reference: Significance - Low)		
A stronger justification needs to be provided for the final selection of the 18 variables that make up the Floodplain Forest Community Index Model.		
(Attachment: Clear Creek Comment 13.docx)		
Submitted By: Meghan O'Connor (561-656-6300). Submitted On: 23-Jul-10		
1 -0		Evaluation Concurred Concur. 1. Adopt. Additional discussion of the parameters (variables) considered and how they were combined will be further explained in the model documentation.
		Submitted By: Robert Heinly (409-766-3992) Submitted On: 17-Aug-10
1 -1		Backcheck Recommendation Close Comment Concur.
		Submitted By: Julian Digialleonardo (561-656-6303) Submitted On: 20-Aug-10
		Current Comment Status: Comment Closed

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ATTACHMENT

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Panel Final BackCheck Response (#2)

Non-Concur. There was a misunderstanding when the Panel interpreted the draft report. The Panel understood that the structure value update relied on post-Katrina replacement costs in 2005. The Panel now realizes that values were updated directly from Jan 2001 assessor's values to Oct 2009 depreciated replacement values. However, the Panel continues to question the reasonableness of increasing assessed structural value by 68% during this period. The assessments can be adjusted for two reasons. The first reason is a change in price level. Several indices are readily available that indicate a price level adjustment of about 35% is appropriate for building costs since 2001. The second reason is methodological bias that can result when assessors' methods differ from the USACE requirement to use depreciated replacement values. The Panel infers that the assessments are also adjusted by about 25%, with compounding, for methodological bias. It is this adjustment that has not been adequately explained.

This issue is complicated by the use of assessment values for several types of properties from three different assessors. The Panel focused on residential properties and their values because they are associated with about two-thirds of equivalent annual damages. More of these residences seem to be located in Harris County than any other county. So, the Panel looked for methodological bias in Harris County assessments of residential structures and found none.

The Panel relied on the Brays Bayou Federal Flood Control Project Harris County, Texas, Alternative To The Diversion Separable Element, General Reevaluation Report. This widely accepted report seems to conclude that there is no relevant methodological bias:

“HCAD property data for residential properties was developed using a cost approach consistent with the Corps requirements. The cost approach is the backbone of the property tax appraisal system for HCAD, which assesses the improvement value using estimates on what it would cost to replace the improvements (buildings) and then subtracting an amount for accrued depreciation. The cost approach provides a structure value consistent with the replacement cost less depreciation. Sampling was performed to validate the use of the secondary data (HCAD) using the Marshall & Swift Residential Cost Estimator Program... No adjustments were made to the residential property values.” (p. 11 Appendix 6, Economic Analysis, September 2005.)

USACE lists many potential problems with using the assessor values that seem to relate to the total value of the assessment and not the structural value. The Texas Comptroller of Public Accounts conducted an Appraisal Standards Review (<http://www.window.state.tx.us/taxinfo/proptax/cadreports/asr/harris/execsum.html>) of the Harris County Appraisal District. Published in 2007, this review was based on 2005 assessments. The Comptroller concluded that the median assessed value of both single family and multi-family residential properties was 98% of market value.

Methodological bias may be found in data from other assessors or for commercial property types. The GRR needs to be more specific in identifying the sources and magnitude of any such bias so that the rationale for adjustments to structural values is clear and fully justified. The details of the statistical analysis that led to an approximate methodological bias correction factor of 1.25 should

be presented in the GRR. Also, if the methodological bias varies considerably by assessment district or land use type, the rationale for applying only one correction factor throughout the study area needs to be explained.

Clear Creek Comment 3 USACE Response

Concur

1. Adopt. A summary of information will be added to the GRR about uncertainty in the economic costs and benefits, including standard deviations and percentiles.
2. Adopt. A summary of information will be added to the GRR about uncertainty in the economic costs and benefits, including standard deviations and percentiles.
3. Adopt. Efforts were made to obtain historic flood damage information for the study area; however, no reliable information exists. This is true in most any flood situation, as estimates of damage are anecdotal and unsubstantiated estimates by local officials. There is no true quantification of flood damages following a flood event, only off-the-cuff estimates that cannot be used to substantiate a rigorous analysis. Also, damage dollar estimates for individual events tend to cross over several watersheds so utilizing estimates from a single event are difficult at best. USACE will evaluate further historical information and attempt to capture damages from historical events and the uncertainty associated with them.

The H&H model was compared with the TS Allison flood event and the model was in agreement with the actual event. A discussion of the model and calibration with TS Allison is in the H&H Appendix. Additional information will be added to the GRR to address the comment.

4. Adopt. The study incorporates sufficient information on the uncertainty of subsidence in the watershed through evaluation of historic information along with model runs to evaluate the future impacts of continued subsidence. The affect was found to have minimal impacts on flood flows. As the comment relates to sea level rise, the recommended plan is the result of a study to evaluate reduction of riverine flood risk. Also, the recommended plan is sufficiently upstream of almost all tidal impacts so sea level changes are minimal, if not non-existent. To address the comment USACE will provide a discussion of the sensitivity analyses.
5. Adopt. The uncertainty in this factor is so high that it would be unreasonable to attempt to calculate or evaluate it in a reasonable manner. In the last few years storms have been more intense, but will this trend continue, and if so at what rate. Additional attempts to quantify or describe this uncertainty would add little to the documents that would help decision makers determine the feasibility of the project. After discussion it was determined that the USACE would consider doing sensitivity analysis to demonstrate what would happen if there were changes in rainfall depths/storms over the next 50 years. If there is benefit, USACE will show how this will affect the recommended plan and the without project scenario and will include discussion in the report.
6. Adopt. Similar to the response for point number 5 above, the impact of the recommended plan on the level of life safety are so uncertain that an attempt to document it would add little to the documents, short of showing that the team understands that there is a level of risk present, whatever that level may be. After discussion it was determined that USACE would add a discussion of life safety implications from the recommended plan.

7. Adopt. The following discussion will be added to the GRR. Superfund sites (Brio Refinery and Dixie Oil Processors) are located just downstream of the conveyance improvement on Mud Gully. The potential discharge of affected groundwater has been contained through corrective action by the responsible parties and the TCEQ. Remedial action at both sites involved the construction of a soil cap over the residual waste, significantly reducing the potential for direct contact with surface waters and sediments. Subsequently, the concentrations of pollutants in the waters and sediment of Mud Gully and Clear Creek have decreased significantly. Construction of the project would reduce the surface flood elevations in the area, further reducing the potential for flood waters to impact to the sites during major flood events.

8. Adopt. Maps for the 1-percent annual exceedance probability flood plains and water depths in 2020 for the Without Project and Recommended Plan conditions were provided in the GRR and SEIS. Maps for the 10-percent and 0.2-percent annual exceedance probability flood plains and water depths in 2020 for the Without Project and Recommended Plan conditions will be provided in the revised GRR for comparison. Maps for the 2070 Without Project and Recommended Plan conditions were not and will not be provided as the changes are so subtle that they cannot readily be seen by the reader. Thus, including them does not add to the discussion.

9. Adopt. The GRR and its supporting documents will be modified to address inconsistencies. The USACE will add more information to show derivation of discharge uncertainty.

Clear Creek Comment 4 USACE Response

Concur.

1. Adopt. The historical data the team utilized was collected from 1965 to 2000. The paper lab reports have no geo-reference data to link the lab tests to a specific location. A total of 170 samples were found with test information varying from water content, dry density, liquid limit, plastic limit, undrained shear strength and direct shear test with drained friction angles. The tests from 1965 were performed by Galveston district lab, and 1984 through 1992 were performed by southwestern lab. The authenticity of the data is undisputable; the data also reflect the general soil condition of the project area, with high plasticity clay liquid limit (LL) range from 50 to 92, Plasticity Index (PI) range from 30 to 60, and lean clay LL range from 20 to 50, PI range from 6 to 32. Therefore the data can be used to generalize the soil profiles of Clear Creek project area based on experiences gained from other project. A table will be added to the Engineering Appendix detailing all geotechnical information on soils available.

Clear Creek flows between three county (Harris County, Brazoria County and Galveston County) lines in southeast Texas. In this region, the majority of soils consist of clay with high water content and high plasticity range from lean clay (CL) to high plasticity clay (CH). There are also sporadically sand deposit sites. The clay will shrink with loss of water and expand when saturated. In general, high plasticity clay has good erosion resistance capabilities. This is one of the reasons to adopt an unconventional design to maintain natural creek with only bench cut on the shoulders to accommodate a flow event. A conventional design would excavate the main channel and line the channel with articulated concrete block, concrete lining or permanent turf reinforce mat such design can be seen in Houston metropolitan areas. Slides and slumps will most likely to happen during a flood event because the hydraulic force acts on particular locations causing material losses in the nearby location. Since the project area has very little elevation variation, the slides and slumps will be within the creek main channel which will not post any danger to a structure or cause landslide. During design phase, erosion concern areas will be designed to minimize localized erosion with riprap, permanent turf reinforced mat, articulated concrete block and other technology.

2. Not Adopt. Due to the nature of the area and the consistency of soil characteristics no additional analysis will be included in the GRR on the historic nature of geologic information in the floodplain. Additional analysis will be performed during PED to address soil characteristic requirements.

3. Not Adopt. Due to the nature of the area and the consistency of soil characteristics no additional analysis will be included in the GRR on the historic nature of geologic information in the floodplain. Additional analysis will be performed during PED to address soil characteristic requirements.

4. Adopt. Additional analysis will be performed during PED to address soil characteristic requirements.

5. Adopt. Additional analysis will be performed during PED to address soil characteristic requirements. According to EM 1110-2-1902 factor of safety required for End-of Construction is 1.3, and Long term will be 1.5. Base on the generalized soil profile stability analysis, the factor of safety is above the required factor safety for the channel slope and the retention pound. The bench cut means excavate the materials on the shoulders; the excavation will release the overburden stress of the shoulders which may cause the shoulders to heave after the excavation. The excavation should not cause stability issues since this kind of excavation has been carried out in many of other projects in Houston region through the district, none of which cause slope stability problem to a project. The excavated material will be transported to a placement area outside of the project area if the material is not suitable for backfill or other construction purposes.

As it relates to seismic concerns the project area is categorized as non seismic region according to ER 1110-2-1806; however, there are a few normal faults in the coast of Texas region. No survey of the fault lines has been conducted for the Clear Creek project, because the risk is considered very low. All of the features proposed are for increased conveyance and none of them hold water in a manner that would increase risk downstream similar to a dam.

6. Adopt. Additional analysis will be performed during PED to address soil characteristic requirements.

7. Adopt. The SEIS details information on expected rates of subsidence in the watershed and sensitivity analysis was performed. Continued subsidence is not expected to increase floodflows so no additional analysis was performed. Additional information the Subsidence District in Harris County will be incorporated into the Engineering Appendix detailing subsidence rates in the region and potential impacts.