



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

CECW-ZB

JAN 30 2013

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Clear Creek, Texas, Flood Risk Management Project – Final USACE Response to Independent External Peer Review

1. Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act of 2007, EC 1165-2-209, and the Office of Management and Budget's Final Information Quality Bulletin for Peer Review (2004).
2. The IEPR was conducted by Battelle Memorial Institute. The IEPR panel consisted of nine members with technical expertise in economics, environmental processes, geotechnical engineering, coastal engineering, and plan formulation.
3. I approve the final written responses to the IEPR contained in the enclosed document. The IEPR Report and USACE responses have been coordinated with the vertical team and will be posted on the Internet, as required in EC 1165-2-209.
4. If you have any questions on this matter, please contact me, or have a member of your staff contact Ms. Sandy Gore, Deputy Chief, Southwestern Division Regional Integration Team, at 202-761-5237.

Encl

STEVEN L. STOCKTON, P.E.
Director of Civil Works

**Clear Creek, Texas
Flood Risk Management Project
General Reevaluation Report and
Supplemental Environmental Impact Statement**

**U.S. Army Corps of Engineers Response to
Independent External Peer Review
January 2013**

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of WRDA 2007, EC 1165-2-209, and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (2004).

The goal of the U.S. Army Corps of Engineers (USACE) Civil Works program is to always provide the most scientifically sound, sustainable water resource solutions for the nation. The USACE review processes are essential to ensuring project safety and quality of the products USACE provides to the American people. Battelle Memorial Institute (Battelle), a non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to conduct the IEPR of the Clear Creek, Texas, Flood Risk Management Project, General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS).

The Battelle IEPR panel completed a review of the preliminary draft GRR and SEIS prior to the Alternative Formulation Briefing in May 2009. Based on the review, a final IEPR Report (dated May 12, 2009) was prepared. The 2009 IEPR review generated a total of 27 comments. Of these 27 comments, four were identified as having high significance, 14 were identified as having medium significance, and nine were identified as having low significance.

Comments generated from the 2009 IEPR review were taken into consideration during preparation of the revised draft GRR and SEIS. Due to the amount of revisions from the preliminary draft GRR and SEIS to the revised draft GRR and SEIS, USACE requested another IEPR on the revised draft GRR and SEIS. In response to the charge, Battelle prepared a 2nd final report (dated July 23, 2010) that generated 13 final panel comments. Of these, 3 were identified as high significance, 6 had medium significance, and 4 had low significance.

The following discussions will present the final responses to the original 27 comments contained in the 2009 Battelle Report, as well as the 13 comments contained in the July 2010 Battelle Report.

MAY 2009 IEPR COMMENTS

1. Comment – *High Significance*: 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.

This comment includes three recommendations for resolution, two of which have been adopted, and one of which has not been adopted, as discussed below. Additional discussion regarding this comment is included below in Comment 1 of July 2010 follow-up review. The comment identifies the need to be consistent with guidance that details how to address construction of flood risk reductions features in the study area during the study process.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the Draft GRR (a) demonstrate that Section 575 applies to the Clear Creek tributaries. In response, the analysis was completed and included in the Economic Appendix - Section 575 Analysis. In addition, the panel recommended (b) steps 2 through 4 be conducted in compliance with Section 575 as detailed in subsequent implementation guidance. In response, all required steps for an evaluation of economic benefits and costs for projects were conducted and displayed in the Economic Appendix - Section 575 Analysis. A summary of the Section 575 Analysis is also included in the GRR - Section VI – Economic Evaluation. The non-Federal projects (FEMA buyout and detention on Marys Creek) augments the Recommended Plan by reducing residual damages and increasing benefits, therefore, additional modification to the design and operation of the recommended Federal plan was not required.

USACE Response: Not Adopted.

The IEPR panel recommended (c) the Draft GRR display the non-Federal and Federal cost sharing that is actually incurred for the FEMA buyout. Federal and non-Federal cost sharing from activities that did not involve a USACE action are not displayed in the GRR. The buy-out process was managed and funded through FEMA and local floodplain administrators. However, the Section 575 analysis did include analysis with the homes in place and with the homes removed.

2. Comment – *High Significance*: Information in the Economic Evaluation needs to be updated and rely less on appraisals from October 2005 price levels.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for updated appraisal information.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) USACE update value of development from 2001 directly to 2008. The Economic Appendix was updated to include this information in the Damage Categories - Residential Property Values section.

3. Comment – *High Significance*: 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.

This comment includes eight recommendations for resolution, seven of which have been adopted and one of which has not been adopted, as discussed below. The comment details the need for additional information on how alternatives were developed, evaluated and selected.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) the main text of the GRR be rewritten to describe how risk and uncertainty were considered in comparing and evaluating the alternatives. The panel also recommended (b) greater detail be provided about how uncertainty was considered in estimating benefits, including giving the type of distribution assumed and the value of its characteristics and any relationships to other variables for each variable with quantified risk, stratifying the uncertainty estimate of first-floor elevations by type of survey and land use and limiting the range of vehicle damage uncertainty using more defensible assumptions. In response, the GRR was modified to further clarify risk and uncertainty and provide greater detail on the quantified risk and distribution types. These revisions were included in Section VII. Risk and Uncertainty Analysis in the GRR and in the Economic Appendix, Analytical Tools and Risk and Uncertainty Section, Damage Categories Section, and Attachment 6 - Sensitivity Analysis. However, stratification of the finished floor uncertainty estimate is not warranted given the same survey methods (land survey vs. windshield survey) and the limited number of commercial structures and damages occurring to those structures.

The panel recommended (c) discuss how life-safety risk is impacted by the potential alternatives and (d) how life cycle costs are affected by the potential alternatives along with (e) showing the risk of flooding in terms of flood depths and frequencies across the area for the existing condition and with the NED Plan in place in the main text of the GRR, (f) running the HEC-FDA model with a higher level (and perhaps also with the maximum values) of hydraulic uncertainty to view the sensitivity of the model to stage-discharge uncertainty values used and to evaluate whether these assumptions are crucial to the final results, and explaining how the risk of flooding is affected by hurricane storm surges for the alternatives. In response, additional information was added to the report to detail the areal extent of individual flood events, amount of rain in these events and the damages associated with them. The derivation of the hydraulic uncertainty values was re-evaluated. Engineering and life safety aspects were considered during the plan formulation process. The IEPR panel also recommended that (g) hurricane storm surge be considered in the analysis. In response, the GRR was modified to explain that the scope of the study only evaluated riverine flood damages and surge was not considered when evaluating flood damages. The report modifications were made in the GRR - Section IV - Plan Formulation,

Without-Project Condition/No-Action; Section VI - Economic Evaluation; and Section VII - Risk and Uncertainty Analysis. The Economic Appendix - Analytical Tools and Risk and Uncertainty and WOP Conditions sections were also revised to include these additional analyses. A side analysis for hydraulic uncertainty and sensitivity was completed under guidance from HEC.

USACE Response: Not Adopted.

The IEPR panel recommended (h) presentation of the probability that the benefit-cost ratio of the NED Plan is greater than 1.0. The comment has merit and USACE is working on methodologies to enable expressing the uncertainty associated with both cost and benefits in a coherent and meaningful way. To date, those methodologies are not sufficiently robust to add any meaningful information to the presentation of costs and benefits.

4. Comment – *High Significance*: The habitat model has fundamental deficiencies in many areas.

This comment includes seven recommendations for resolution, six of which have been adopted, and one recommendation was not adopted. The comment regards additional clarification and justification for information utilized in the environmental modeling procedures.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended that the habitat model (a) include verification of plant community input data with new data collected, and new information on sampling procedures developed. In relation to the first recommendation, the IEPR panel recommended (b) sensitivity analyses be conducted to demonstrate how errors in model inputs and differences in model assumptions impact model outcomes. In response, the habitat model was revised to verify plant community input data and sensitivity analyses. The IEPR panel recommended (c) the choice of model parameters and summary indices be justified by reference to the literature or revised to be more relevant to scientific hypotheses, and (d), justification of assumptions for future scenarios (Tables 14-19) by reference to the literature or revision to be more relevant to scientific hypotheses. In response, the choice of model parameters and summary indices and assumptions for future scenarios were justified or revised to be more relevant to scientific hypotheses. The IEPR panel also recommended that (e) speculation on outcomes unrelated to the model (e.g. naturalness, wildness, and beauty) be removed such that outcomes are supported by data and (f), that the use of technical terms such as “likelihood” be restricted to their conventional usage. In response to the recommendations, changes were made to the Floodplain Forest Community Index Model for the Clear Creek Watershed, Texas, which was approved for one-time use by the USACE on 26 April 2011. The model document was revised primarily in Chapter 3 and 4; the SEIS, Appendix B (HEP Assessment), was also revised.

USACE Response: Not Adopted.

The IEPR panel recommendation was to further explain/justify the choice of a baseline model from western rangelands. Due to a change in project scope, the analysis of western rangelands was dropped from the analysis so this justification was not needed.

5. Comment – *Medium Significance*: The Purpose and Need should clearly describe how past rain events that have resulted in flooding compared 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.

This comment includes four recommendations for resolution, all of which have been adopted as discussed below. The comment identifies the need for additional information detailing the extent and scope of flood events in the study area.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) describe and exhibit the areal extent of flooding that currently results from a variety of rainfall events, (b) describe the experienced frequency of damaging flood events and the intensity of the associated rain event, (c) quantify damages from experienced damaging flood events, and (d) describe how this system has and will interact with hurricane storm surges. In response, additional maps and information on historical flooding were developed and incorporated into the report. The report was revised to include all of these recommendations in Section II - Problems and Opportunities and the Flood Risk Management section, as well as Section I - Introduction and Section IV- Plan Formulation. The Engineering Appendix, Section 2- Hydrology and Hydraulics was also revised.

6. Comment – *Medium Significance*: The Formulation Objectives, Constraints, and 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.

This comment includes three recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for more information on why ecosystem restoration measures were not pursued in the study.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) provide more of a rationale for using only NED than stating there is lack of a sponsor, (b) indicate how many organizations were asked to sponsor the NER purpose, and (c) give the range of costs for the preliminary NER alternatives for which no sponsor could be found. In response, a rationale for using only NED was incorporated into the GRR, as well as indication of how many organizations were asked to sponsor the NER purpose. This information is located in the GRR Section II - Problems and

Opportunities. However, no preliminary costs for NER alternatives were included if no sponsor was found.

7. Comment - – *Medium Significance*: The rationale for excluding the second outlet from the Without-Project conditions should be clarified.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need to include previously constructed features in the without-project condition utilized for the study.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) be expanded to include the second outlet and gated structure in the without-project condition. In response, the team incorporated the constructed features into the without-project condition for the study. These revisions were made in the GRR - Section IV- Plan Formulation.

8. Comment – *Medium Significance*: Without-Project conditions should cover the period from 2000 to 2070.

This comment includes five recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for expanded economic information to better understand the analysis performed for the study.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended expanding the report to (a) display the number and value of existing structures at the time the inventory was conducted, (b) define current conditions in terms of a time period, (c) display the damages associated with current conditions, (d) explain forecasting methods, and (e) display values and damages in roughly 10-year increments from the date of the inventory to 2070. In response, these recommended changes were incorporated into the GRR and can be found in the Economic Appendix - Hydrologic Conditions in the Without-Project Condition section.

9. Comment – *Medium Significance*: It is unclear if the methodology used to estimate flood damages includes damages from the 1-year event.

This comment includes three recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for expanded H&H information to better understand the analysis performed for the study.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) a comparison of historical damages to estimated damages, especially for frequent events, (b) a comparison of Morganza wave action, salinity, and duration to Clear Creek and tributaries, and (c) explanation of measures taken to ensure HEC-FDA does not estimate damages in the 1-yr event. In response, the HEC-FDA was modified to assure that no damages are being accrued to the 1-year event (100 percent AEP event). The method utilized is recommended by the Hydrologic Engineering Center as the best method to assure no 1-year damages accrue. This modification was prepared by H&H personnel during input of H&H data into HEC-FDA to ensure correctness.

10. Comment – *Medium Significance*: The future conditions assumptions for HEC-1 models appear to be inconsistent with those used for the HEP analysis.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need additional information on consistency of analysis between H&H and environmental activities.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report be expanded to describe if the future growth projections used for each predictive model were based on the same assumptions and define those assumptions. In response, the GRR was expanded to describe the future growth projections. Information on this topic is located in the SEIS Section 4.9.2.1 and Engineering Appendix Section 2.2.1. The revisions resulted in inclusion of additional justification and supporting documentation for the assumptions for the future conditions/growth projections for the HEP analysis. The projections themselves, however, did not change.

11. Comment – *Medium Significance*: 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.

This comment includes two recommendations for resolution, which have been adopted as discussed below. The comment details the need for additional information on how alternatives were analyzed and screened.

USACE Response: Adopted.

Action Taken: The IEPR panel recommendation was to include (a) an explanation of why the clearing and snagging alternative was eliminated and (b) clarification of why some alternatives from the First-Added Measures were not re-evaluated in the Second-Added Measures. In response, the GRR was revised to capture the recommendations. The revisions were added to the GRR - Section V - Plan Assessment and Screening of Alternatives.

12. Comment – *Medium Significance*: 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.

This comment includes four recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for additional information on H&H assumptions utilized in the analysis.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) the display of values of development and damages in 2001, (b) review of the status of NPDES compliance for all communities without storm water detention ordinances, (c) inclusion of detention ordinances as an alternative while giving full consideration to related water quality benefits if increased runoff over time from new development is significant, and (d) explain the sensitivity of the analysis to related assumptions. In response, the GRR was revised to capture the IEPR recommendations. The documents were revised to display this information in the Economic Appendix - Table 8, Engineering Appendix - Section 2.2.3, and GRR Section VII - Risk and Uncertainty Analysis - Identify Risks.

13. Comment – *Medium Significance*: 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.

This comment includes seven recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for additional information related to geotechnical analysis done for the study.

USACE Response: Adopted.

Action Taken: The IEPR recommendation called for (a) a complete evaluation of the potential geologic and geotechnical hazards along with (b) geologic mapping within the watershed to aid in identifying the possible locations of such hazards that require additional evaluation and possible mitigation, if necessary, during design studies. In response to these two recommendations, the Engineering Appendix report was revised, as well the geologic mapping and the correlation of existing test borings. The panel also recommended (c) specific soil profile information of soil types, including depth and corresponding index and strength data for various sections along the creek alignment, and (d) along with typical foundation design parameters for floodwall and other structure evaluation. Additionally, the IEPR panel recommended the GRR (e) include documentation (cross sections depicting soil profiles, slope inclinations, and groundwater conditions) that stability analysis was performed and a comparison of the calculated stability factors to the acceptable design safety factors and (f) provide a discussion regarding moisture conditioning during grading to reduce the adverse impacts of shrinking and swelling. Many revisions were made per the IEPR panel recommendations. The revisions can be found throughout the Engineering Appendix of the GRR. Lastly, the IEPR panel recommended (g)

consideration be given to providing keying and benching recommendations, as well as providing compaction criteria for structural fills in terms of minimum soil compaction at minimum moisture content. In response, the information recommended was also included in the GRR. Report revisions can be found in the Engineering Appendix Geotechnical Section 3.3, 3.6 and 3.10, Soil Mapping Borings (Regional mapping) and the P&S details.

14. Comment – *Medium Significance*: 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.

This comment includes five recommendations for resolution, all of which have been adopted as discussed below. This comment requests additional detail on the environmental impacts..

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) a description that clearly describes the extent of channel alterations, as well as (b) a description of the area and type of wetland impact that would result from construction of each project feature, including construction of mitigation features. In response, this information was added to the report. The panel also recommended that revisions be made to (c) ensure that wetland impacts are described consistently in the text and in the 404(b)(1) Analysis. Another recommendation by the IEPR panel was (d) to include a description of how wetland mitigation would be accomplished and how there would be no net loss of wetland functions and values. In response, this description, along with that of (e) unavoidable impacts, was added in Section 9.0 of the SEIS. The SEIS was also revised in Section 4.9.3.2, Figure 3.9-2 and Appendix O (wetland maps), Appendix L (404(b)(1) analysis) and Section 5.1.1.2 to address the comment.

15. Comment – *Medium Significance*: The impacts from the connected action of relocating pipelines should be included in the analysis.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for additional information on the environmental impacts associated with pipeline relocations.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended that the report be expanded to consider the environmental impacts from relocating 26 pipelines to accommodate implementation of the proposed project, including appropriate mitigation measures. In response, the report was expanded to include this discussion. Report revisions are located in the Engineering Appendix, Civil Section 3.0 – Relocations and Miscellaneous.

16. Comment – *Medium Significance*: There needs to be additional discussion and reference to specific historic data to support the geotechnical design assumptions.

This comment includes four recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for the presentation of geo-technical information collected for the analysis.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended that the report (a) documents the drillings and soil testing performed over a number of decades. In response, these revisions are located and referenced in the Engineering Appendix - Geotechnical Section Borings (Regional mapping). In addition, the panel recommended the report (b) include geologic maps of the floodplain area, (c) the correlation of existing test borings, and (d) Phase 1 environmental assessment by inclusion of a Texas geologic map with the plates. In response, the GRR was modified to include the recommendations. The revisions are included in the Engineering Appendix.

17. Comment – *Medium Significance*: Please clarify how benchmarks for survey elevations will be established and maintained over the estimated 10-year construction schedule, given regional subsidence.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for additional information on how benchmarks are established and maintained.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report be expanded to provide an explanation about how survey benchmarks will be established and maintained throughout the project life and discuss if this plan will have any impact on the estimated cost. In response, the report was expanded to include additional information on benchmark establishment and maintenance. The revisions and discussion can be found in the Engineering Appendix - Civil Section 3.0 – Relocations and Miscellaneous Discussions.

18. Comment – *Medium Significance*: The restoration and management plan currently being proposed may not be feasible.

This comment includes four recommendations for resolution, all of which have been adopted as discussed below. The comment details the need for additional information on how adaptive management will be performed for the environmental and mitigation features proposed.

USACE Response: Adopted.

Action Taken: Recommendations from the IEPR panel included (a) the request to expand the report to provide references or data to justify cost figures, (b) provide references or data to justify proposed restoration and management methods, and (c) revise restoration and management methods if current methods do not match current best practices. Additionally, it was requested that (d) clarified information going into screening level costs and clarified information on methodology be included, although the screening level costs were not changed. In response, the report was revised to include the recommendations. Revisions are included in the Engineering Appendix, Section 5.4 and 5.5. In addition, SEIS Section 5.5 and Appendix J were revised to include additional details of monitoring and management methods that were also requested for the floodplain forested features.

19. Comment – *Low Significance*: The explanation in the Appendix regarding the shift from 2010–2060 to 2020–2070 needs to be discussed in the main text.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for additional information explaining changes to the period of analysis during the study process.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended that the report be expanded to explain the shift of the period of analysis from 2010 to 2060 to 2020 to 2070. In response, revisions were made to the GRR and can be found in Section IV - Plan Formulation, Without Project Condition/No Action, and the Engineering Appendix Section 2.2.3.

20. Comment – *Low Significance*: A comparison between new models and old models should be included, as well as a discussion of why the modeling was updated.

This comment includes two recommendations for resolution, which have been adopted as discussed below. The comment details the need for additional information explaining decision process behind selection of models used in the analysis.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) be expanded to include the reason for the new model development and (b) a comparison of the new model results with older model results. In response, a comparison/discussion of new and old models was done, and is included in Section 2.2.1, Section 2.2.2, and Section 2.2.9 of the Engineering Appendix of the GRR.

21. Comment – *Low Significance*: 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.

This comment includes two recommendations for resolution, which have been adopted as discussed below. The comment details the need for additional geo-technical information on slope stability.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) address surface sloughing of the channel slopes and long-term maintenance issues as well as (b) the cost of this maintenance. In response, the GRR was modified. This information is included in the Engineering Appendix, Geotechnical Section 3.8 - Stability Analysis of Channel Slope and Appendix 6 - Cost Estimate.

22. Comment – *Low Significance*: The erosion threshold of 6 fps needs to be documented.

This comment includes two recommendations for resolution, which have been adopted as discussed below. The comment details the need for additional information on critical flow rates for soil and slopes associated with the proposed project.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the GRR (a) document that the critical flow velocity for the soils along the creek banks is 6 fps and identify if there are areas where flow velocities greater than 6 fps are anticipated. The IEPR panel requested inclusion of the preliminary recommendations for mitigation that are appropriate for these sections and (b) a minimal discussion of scour and applicable mitigation at in-creek improvement. In response, the GRR was modified to include the IEPR recommendations. The additional information is documented in the Engineering Appendix - Section 2.5.11.

23. Comment – *Low Significance*: 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.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for additional information potential stability concerns for construction or material placement if it is near the footprint of excavation activities.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report be expanded to include recommendations for the implementation of “Setback Zones” for improvements constructed near the tops of slopes and areas that receive sediment and soil from detention excavations. In

response the GRR was modified. Additional information has been included in the Engineering Appendix - Civil Section 3.0 and Geotechnical Section 3.8. However, full details will not be developed until preconstruction engineering and design.

24. Comment – *Low Significance*: 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.

This comment includes two recommendations for resolution, which have been adopted as discussed below. The comment identifies the need for additional information detailing the extent of the project floodplain.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended that the report (a) show the change in floodplain extent due to the project and (b) displays the 100-yr overflow for the With-Project condition. In response, the report was modified. These revisions have been added and are included in the SEIS Figure 4.1-1

25. Comment – *Low Significance*: 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.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for additional information in the initial portions of the report where existing condition are described.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the SEIS be expanded to describe the watershed in more detail. In response, the SEIS was expanded to include more detail on the watershed. These revisions are included in the Purpose and Need Section, Section 1.4.

26. Comment – *Low Significance*: Best Management Practices (BMP) that would be employed to mitigate construction impacts to water quality, sediment quality, air quality, and noise impacts should be addressed.

This comment includes one recommendation for resolution, which has been adopted as discussed below. The comment details the need for additional information on use of BMPs during construction.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the SEIS be expanded to define in each applicable section the typical best management practices (BMPs) to be employed to mitigate

construction impacts to water quality, sediment quality, air quality, and noise. In response, the SEIS was expanded to include the BMP information. The following sections were revised: Sections 4.1.1.2, 4.2.2, 4.3.2, 4.4.2.4, 4.5.3, 4.10.2.1, and 4.15.3.2.

27. Comment – *Low Significance*: The interest cost and benefits from the completed features should be calculated for each year during the construction period.

This comment includes three recommendations for resolution, two of which have been adopted, and one not adopted as discussed below. The comment identified the need for additional information detailing specifics of cost and benefit calculation.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) be revised to display details of IDC calculations, and (b) demonstrate proper project implementation timing. In response, the report was modified to include this information. Report revisions are located in the Economic Appendix - Enclosure 5; the Engineering Appendix - Section 2.2.3; and Appendix 6 - Cost Engineering.

USACE Response: Not Adopted.

The IEPR panel recommended the report display details of benefits accruing during construction. The report does not display details of benefits during construction because no benefits are accrued or claimed during construction.

JULY 2010 IEPR COMMENTS

1. Comment – *High Significance*: 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.

This comment includes four recommendations for resolution, three of which have been adopted, and one not adopted as discussed below. The comment identified the need for additional information detailing specifics on implementation of Section 575 guidance and how total project outputs are communicated.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the GRR and Economic Appendix be expanded to include (a) an explanation of how specific language in Section 575 applies to Clear Creek. In response, the GRR was revised to include additional wording on Section 575. Revisions are located in Section VI - Economic Evaluation – Section 575 Analysis, which specifically cites the application to Clear Creek. The panel also recommended (b) identification of the total project output as defined in Step 3 of the Implementation Guidance. In response, the analysis was

completed and included Step 3 as detailed in the guidance and resulted in presentation of a BCR of the project, which includes total project outputs. The IEPR panel recommended (d) identification of Section 575 features in the Tentatively Recommended Plan. In response to the IEPR recommendations above, the report was revised and now includes presentations on Section 575. These expanded presentations are provided in the GRR, Economic Appendix- Section 575 Analysis and Section VI – Economic Evaluation, Section 575 Analysis. The non-Federal projects (FEMA buyout and detention on Marys Creek) augments the Recommended Plan by reducing residual damages and increasing benefits, therefore, additional modification to the design and operation of the recommended Federal plan was not required.

USACE Response: Not Adopted.

The IEPR panel recommended reformulation of the Tentatively Recommended Plan to provide the total project outputs throughout the study area to more efficiently achieve the total project output. Reformulation of the plan and identification of the Section 575 features in the plan were not required because inclusion of the non-Federal projects resulted in BCRs above unity.

2. Comment – *High Significance*: The values used in the Economic Evaluation need to be updated directly from 2001 values to current values.

This comment includes two recommendations for resolution, one which was adopted, and one which has not been adopted, as discussed below. The comment identified the need for additional information on how price leveling and incremental analysis was considered in the report.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) include a direct update from the 2001 price levels. Throughout the entire report, the price level was updated directly from 2001 to the current FY12 price level. Additionally, the Economic Appendix was revised in the “Damage Categories, Residential Structures Section.”

USACE Response: Not Adopted.

The IEPR panel raised a concern about (b) incremental analysis of recommended features using current costs, discount rates, and benefits. Independent valuations were made, which are more reliable than tax assessor values and based on actual structure surveys, photos, square footage, building characteristics, quality of the construction and depreciation. The recommended features were updated to current price levels and discount rate, however, additional incremental analysis was not performed based on current costs after selection of the Recommended Plan.

3. Comment – *High Significance*: Risk and uncertainty have not been fully implemented in evaluating and formulating alternatives.

This comment includes nine recommendations for resolution, seven which were adopted, and two which were not adopted, as discussed below. The comment identified the need for additional information on how risk and uncertainty was captured throughout the entire analysis.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report include (a) a discussion of the uncertainty in estimated benefits in 2020 compared to estimated benefits in 2070. In response, a summary of information was developed and added to the GRR. The IEPR panel recommended (b) 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. In response, additional summary information on impacts of subsidence and sea level rise were added to the report. The IEPR panel recommended the inclusion of (c) 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. In response, additional information on storm uncertainty was developed and included in the report. The IEPR panel recommended the inclusion of (d) a discussion about how life safety risks are affected by the various alternatives, as well as uncertainty in life safety risks. In response, additional information on life safety risks was developed and included in the report. The IEPR panel recommended (e) a more detailed explanation of why extreme flooding will not impact the Superfund sites, including information about location, topography and in situ containment measures. In response, additional details about elevations and locations of Superfund sites was developed and added to the project. The IEPR panel recommended the inclusion of (f) maps with the 10-percent, 1-percent and 0.2-percent annual exceedance probability floodplains and water depths in 2020 and 2070 for the Without Project and Recommended Plan conditions. In response, the suggested maps were developed and included in the report. The IEPR panel recommended that the report and appendices utilize (g) consistent stage-discharge uncertainty values across all appendices. In response, the reports were scrubbed for consistency and appropriate changes made. These changes to the report are located in the Economic Appendix - Expected Annual and Average Annual Equivalent (AAE) Damages section, Engineering Appendix –Section 2.2.4 and Exhibit 2-3, and in the GRR – Section VII - Risk and Uncertainty Analysis - Identify Risks, Section IV- Plan Formulation, Without Project Condition/No Action, Section VII - Risk and Uncertainty Analysis - Guidance and Concepts, and Section VII - Description of Tentatively Recommended Plan.

USACE Response: Not Adopted.

The IEPR recommended (h) developing a summary of information in the GRR about uncertainty in the economic costs and benefits, including standard deviations and percentiles. USACE is working on methodologies to enable expressing the uncertainty associated with both cost and benefits in a coherent and meaningful way. To date, we have not developed a standard procedure for calculating probabilities/standard deviations in a way that would convey meaningful information in the GRR. Additionally, the panel recommended the (i) comparisons of model predictions with historical data. In response, efforts were made to obtain historic flood damage information for the study area. However, no reliable information exists which 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. In addition, damage dollar estimates for individual events tend to cross over several watersheds so utilizing estimates

from a single event are difficult at best. Further evaluation on historical information was conducted with an attempt to capture damages from historical events and the uncertainty associated with them. Additionally, as part of this comparison with historical data, the panel recommended that the H&H model be compared with the Tropical Storm (TS) Allison flood event. This comparison was completed and the model was in agreement with the actual event. A discussion of the model and calibration with TS Allison is located in the H&H Appendix of the Engineering Appendix.

4. Comment – *Medium Significance*: 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.

This comment includes seven recommendations for resolution, five which were adopted and two which were not adopted, as discussed below. The comment identified the need for additional information detailing historic geologic conditions.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report be revised to detail all of the geotechnical information on soils available. These recommendations included the addition of (a) discussion of and reference to the reports that document the drillings and soil testing performed over a number of decades, (b) historic geologic maps of the floodplain area, (c) documentation (cross sections depicting soil profiles, slope inclinations, and groundwater conditions) that stability analysis was performed for steady state, rapid draw-down, and seismic conditions, including a comparison of the calculated stability factors to the acceptable design safety factors, and (d) typical cross sections modeled and the results of the slope stability analysis that supports the conclusion that the design slopes are stable. The IEPR panel recommended (e) discussions about the rates, depths, and locations of regional subsidence as well as a discussion of the estimated settlement associated with the placement of fill were also recommended. In response to the above recommendations, the GRR was expanded. Revisions are found in the Engineering Appendix in Section 3.3.2. In addition, a Texas Geologic Map was added with the plates along with revisions to Plate 1, 2 and 3. Additional information also includes stability analysis output, a seismic condition map from USGS, and UT4 graphic. These items were added as appendices to the Engineering Appendix, and an additional paragraph was added to Section 3.2 discussing geohazardous concerns in the project area. Also added is the subsidence meter reading in the general areas.

USACE Response: Not Adopted.

The panel recommended (f) analysis be performed on the historic nature of geologic information in the floodplain and (g) specific soil profile information that includes soil types with depth and their corresponding index and strength data also be included. Due to the nature of the area and the consistency of soil characteristics, no additional analysis could be included on this information. With the information known, the Engineering Appendix was revised to include all known information on Plates 1, 2, and 3. Additional analysis will be performed during PED to address soil characteristic requirements.

5. Comment – *Medium Significance*: The proposed approach to establishing and maintaining benchmarks is not feasible because of regional subsidence.

This comment includes two recommendations for resolution, which were adopted as discussed below. The comment identified the need for additional information on successful benchmark development prior to construction activities.

USACE Response: Adopted.

Action Taken: The IEPR recommended the report (a) be modified to include 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 and (b) 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. In response, additional information was added to the report detailing how benchmarks would be established and maintained. This information is included in Section 3.0 of the Engineering Appendix.

6. Comment – *Medium Significance*: 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.

This comment includes three recommendations for resolution, two which were adopted and one which has not been adopted, as discussed below. The comment identified the need for additional information on how a successful mitigation plan is developed and constructed.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report (a) include a comprehensive restoration plan that provides 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. The panel also recommended the report (b) include a strategy for how restoration would be achieved for the zones of hydric conditions. In response, the report was modified to clarify what steps will be taken in the mitigation areas to ensure that the sites are successful. Additional information on monitoring and adaptive management was added to address both recommendations.

USACE Response: Not Adopted.

The IEPR panel also recommended that the report (c) include a more detailed cost estimate for restoration activities. This recommendation was not adopted as the current cost estimate adequately captures the details of the mitigation, monitoring and adaptive management plan documented in the GRR/SEIS as necessary for a feasibility level study.

7. Comment – *Medium Significance*: The stability analysis section of the GRR should be expanded to address the use of "Setback Zones" near the top of slopes.

This comment includes two recommendations for resolution, which were adopted as discussed below. The comment identified the need for additional information on placement of excavated materials and construction of structures adjacent to the proposed conveyance channels.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the report include (a) discussion on how the stability analysis considered excavated soil and improvements so that risk to slope failure is minimal and (b) identification of formal set-back requirements for placement or construction near side slopes of conveyance channels. In response, the report has been modified to clarify the current plan to transport the excavated material to placement areas outside of the project area. A set back has been established and has been better explained in the Engineering Appendix. The Engineering Appendix was revised to include this information in Civil Engineering Section 3.0 and Geotechnical Engineering Sections 3.7, 3.8 and 3.9.

8. Comment – *Medium Significance*: Benefits from the second outlet should be included when considering induced damages.

This comment includes one recommendation for resolution, which was adopted as discussed below. The comment identified the need for additional information on expected flows during flood events and steps that will be taken to address potential problems.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended that the report include additional information on the calculation and display of benefits and induced damages based on the total authorized project, including any eligible Section 575 features. In response, the report was modified to include benefits and induced damages in the Recommended Plan section and quantified in Tables 19 through 24 of the Economic Appendix. The Section 575 portion of the Economic Appendix has been modified to include quantification of the effect of the Section 575 analysis.

9. Comment – *Medium Significance*: The mitigation plan does not explicitly describe its elements and whether the goal of No Net Loss of wetlands would be accomplished.

This comment includes one recommendation for resolution, which was adopted as discussed below. The comment identified the need for additional information on needed mitigation and steps that were taken to ensure its success.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended clarification of what wetland mitigation measures will 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. Acreages identified in this comment refer to an ecosystem restoration feature that was subsequently removed from consideration and subsequently from the report. In response to the recommendations, the report was revised to state what steps will be taken for adaptive management and describe where the 7.5 acres of wetlands preserved are located and how that accomplishes No Net Loss. The SEIS Sections 4.9.3.2, 5.1.1.2, 5.5.1, and 5.5.2 have been revised to include this information.

10. Comment – *Low Significance*: The period for the Habitat Evaluation Procedures (HEP) projections is inconsistent with the referenced census tract population projections.

This comment includes two recommendations for resolution, which were adopted as discussed below. The comment identified the need for ensuring consistency between census and environmental information included in the report.

USACE Response: Adopted.

Action Taken: The IEPR panel recommendation included modification of the report (a) to ensure consistency in assumptions and (b) consistency between development projections and analyses throughout the GRR, DEIS, and supporting documentation. In response, the documents were reviewed for consistency and the SEIS Section 4.9.2 and Engineering Appendix Section 2 were modified to address the comment.

11. Comment – *Low Significance*: There appears to be inconsistency between the GRR and PDEIS in the reporting of forest floodplain impacts.

This comment includes one recommendation for resolution, which was adopted as discussed below. The comment identified the need for ensuring consistency in environmental impacts between the different reports.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended the GRR and SEIS be revised throughout (a) to insure consistency in the information provided, such as consistent and accurate descriptions of project impacts and mitigation between documents. In response, the documents were reviewed for consistency and revisions were made throughout the GRR and SEIS.

12. Comment – *Low Significance*: Areas that require erosion protection should be identified to aid in developing preliminary construction costs associated with providing erosion protection.

This comment includes four recommendations for resolution, three which were adopted and one which has not been adopted, as discussed below. The comment identified the need for additional information on expected flows during flood events and steps that will be taken to address potential problems.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) identification of reaches where flow velocities exceed 6 fps, (b) a description of the appropriate erosion protection, (c) and associated anticipated construction costs for areas where flow velocities exceed 6 fps. In response, additional information was added to the report describing expectations of flows as well as steps that will be taken in areas where erosion is possible. These revisions are included in the Engineering Appendix in Section 2.5.11, Geotechnical Section 3.12.5, on the plans and as a line item on the cost estimate.

USACE Response: Not Adopted.

The IEPR panel also recommended the inclusion of (d) 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. This was not adopted as the team determined that Feasibility level costs were of sufficient accuracy to properly capture the expected costs of constructing erosion protection.

13. Comment – *Low Significance*: A stronger justification needs to be provided for the final selection of the 18 variables that make up the Floodplain Forest Community Index Model.

This comment includes one recommendation for resolution, which has been adopted, as discussed below. The comment identified the need for additional information detailing parameters utilized for habitat modeling and how they were selected.

USACE Response: Adopted.

Action Taken: The IEPR panel recommended (a) the addition of discussion on why certain parameters (variables) were selected over others, information on what other parameters were considered as well as including information on combinations of parameters considered. Appendix B of the DEIS was modified to include information on the parameters considered and selected. Also, the Floodplain Forest Community Index Model was reviewed separately in the model approval process and this model was approved for one-time use on 26 April 2011.