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

REPLY TO
ATTENTION OF

JUL 09 2015

CECW-MVD

MEMORANDUM FOR Commander, Mississippi Valley Division (CEMVD-PD-SP)

SUBJECT: USACE Response to Independent External Peer Review (IEPR), East St. Louis, Illinois, Flood Protection, Design Deficiency Study, Limited Reevaluations Report (LRR) and Environmental Assessment

1. Reference:

a. CEMVD-PD-SP memorandum, dated 7 March 2015, subject as above; and

b. CEMVD e-mail, dated 30 April 2015, subject: ESTL and Prairie du Pont Agency responses.

2. The final written responses to the IEPR are approved. The enclosed document contains the final written responses of the U.S. Army Corps of Engineers to the issues raised and recommendations contained in the IEPR report. Please ensure the final written responses are posted on the District's website along with the original IEPR report, as required by EC 1165-2-214.

3. Any questions on this matter should be directed to Mr. John Lucyshyn, Mississippi Valley Division Regional Integration Team, at 202-761-4515.

Encl

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

Printed on Recycled Paper

**East St. Louis, Illinois, Flood Protection Project**
**Design Deficiency Study**
**Limited Reevaluation Report and Environmental Assessment**

**USACE Response to Independent External Peer Review**
**May 2015**

Independent External Peer Review (IEPR) was conducted for the subject project in accordance with Section 2034 of the Water Resources Development Act (WRDA) of 2007, U.S. Army Corps of Engineer (USACE) guidance on *Civil Works Review,* EC 1165-2-214 (2012); and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (2004).

This flood risk management design deficiency limited reevaluation study was carried out under the authority of Section 216 of the Flood Control Act of December 31, 1970 (Public Law 91-611) which says "The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operations, and for improving the quality of the environment in the overall public interest." The study examined the need for modifications to the East St. Louis, Illinois, Flood Protection Project project to correct design deficiencies in underseepage and through-seepage controls. The study was cost-shared.

Independent External Peer Review (IEPR) for the limited reevaluation study was initiated and the documents to be reviewed were provided to the IEPR panel in June 2010. The Final IEPR Report was completed in August 2010, and the USACE/IEPR panel comment and response process was completed in August 2010. The IEPR panel consisted of five individuals selected by Battelle Memorial Institute with technical expertise in National Environmental Policy Act impact assessment, civil engineering, geotechnical engineering, cost engineering, and economics.

After the study phase, the project will move into Pre-Construction, Engineering, and Design phase (PED) to continue to refine and develop plans and specifications for the project.

## IEPR on Draft Limited Reevaluation Report

Battelle, a non-profit science and technology organization, issued the final report from the IEPR on August 3, 2010. The final IEPR report contains a total of 20 comments categorized by level of significance: 5 comments are identified as having high potential significance, 8 are identified as having medium potential significance, and 7 are identified as having low potential significance. The comments are presented in the order of high, medium, and low significance.

*'High': Describes a potential fundamental problem with the project that could affect the recommendation or justification of the project.*
*'Medium': Potentially affects the completeness or understanding of the reports/project*

*'Low': Potentially affects the technical quality of the reports but will not affect the recommendation of the project."*

The following outline summarizes USACE actions which addressed each recommendation for each of the comments provided.

The following discussions present the USACE Final Response to the 20 IEPR comments.

**1. Comment – *High Significance*: Potential hazardous, toxic, and radioactive waste (HTRW) considerations could affect cost, scheduling, and implementation of the tentative recommended plan and should be addressed prior to construction.**

The panel experts recommended the following actions to resolve this comment:

A description of studies that would be done prior to preparation of plans and specifications. The description would need to address the following:

a. Investigation of soil and groundwater contamination along the potentially affected portion of the alignment during the design phase.

b. Identification of specific disposal options for contaminated soil and groundwater.

c. Design of HTRW details.

d. A framework to obtain EPA and other regulatory agency concurrence prior to construction.

USACE Response: Adopted.

**Action to be Taken:** The Phase 2 Environmental Site Assessment (ESA) will be completed in preconstruction, engineering and design and applicable HTRW design considerations will be addressed prior to construction.

**2. Comment – *High Significance*: All potential modes of levee failure and the transition between various levee system components need to be evaluated in the design.**

The panel experts recommended the following actions to resolve this comment:

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

a. A description of how the following items would be addressed prior to development of plans and specifications:

1) Potential levee through-seepage.

USACE Response: Adopted.

**Action Taken:** Levee through-seepage was not observed to be a universal problem through the Metro East Sanitary District (MESD) project during the 1993 flood. Discussion of observations and potential solutions for through-seepage observed at the 'Phillips Reach' was added to Section D.6 of the Geotechnical Engineering Appendix and to Section 2 and Section 5.3.4 of the Main Report.

2) Levee slope stability, particularly for steady-state seepage conditions.

USACE Response: Not Adopted.

Although some minor instabilities have occurred on the landside slope of the MESD main stem and upper flank levees, these are not significant enough to warrant a full study. However, in a portion of the MESD lower flank, some significant slope stability problems have been observed. This is being addressed in the "Alton to Gale Consolidated Levee Districts, IL, Design Deficiency Study". This study is referenced in paragraph 4.4 of the Main Report.

3) The stability and seepage cutoff design of the "I-walls."

USACE Response: Not Adopted.

I-wall concerns are beyond the scope of the subject LRR. Although no issues related to T-wall or I-wall distress were reported during the 1993 flood, the project I-walls were inventoried and analyzed in the aftermath of Hurricane Katrina per the Corps revised interim I-wall guidance. The evaluation of the I-walls in the East St. Louis Project indicated no issues or deficiencies.

4) The transitions between "I-wall" and embankment levee sections as well as the transitions between other levee details.

USACE Response: Not Adopted.

The project I-walls were inventoried and analyzed in the aftermath of Hurricane Katrina per the Corps revised interim I-wall guidance. The evaluation of the I-walls in the East St. Louis Project indicated no issues or deficiencies.

b. Identification of any additional remedial measures required to satisfy seepage or stability design criteria. These measures should be included in plan formulation.

USACE Response: Adopted.

**Action to be Taken:** USACE will identify and include additional remedial measures as appropriate in the plans and specifications phase of this project.

**3. Comment – *High Significance*: The Chain of Rocks levee is not included in the Limited Reevaluation Report (LRR), although it is part of the overall levee system protecting the Metro East Area and must be able to be certified as providing 100-year flood protection.**

The panel experts recommended the following actions to resolve this comment:

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

a. A section explaining how the Chain of Rocks east levee fits into the overall East St. Louis Flood Protection Project system.

USACE Response: Adopted.

**Action Taken:** Information was added to the Main Report Section 4.3 discussing the Federal construction of the Chain of Rocks levee and its operation and maintenance responsibilities, the 1997 Design Deficiency Report, the problems with the levee, and the status of the ongoing Federally-funded project to correct the deficiencies. There was also added discussion added to Main Report Section 5.1.1.1 regarding the relationship of the Chain of Rocks levee with the effort to get 100-year flood certification in the Metro East area to comply with the FEMA program.

**4. Comment – *High Significance*: Constructability of the clay-filled trench option needs to be reconsidered relative to adverse subsurface conditions as they potentially affect construction risk.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A section addressing the constructability of the proposed clay-filled trench alternative.

USACE Response: Adopted.

**Action to be Taken:** During the plans and specifications phase, USACE will verify the conditions existent at this site and confirm the constructability of the clay-filled trench.

b. Temporary slope stability analysis to consider seepage and the soft soil strengths.

USACE Response: Adopted.

**Action to be Taken:** During the plans and specifications phase, USACE will determine the conditions existent at this site. If conditions remained problematic for use of the shallow clay filled trench, USACE will consider a slurry trench cutoff dug with hydraulic excavator.

**5. Comment – *High Significance*: The selection of a cement bentonite (CB) wall as compared to other cut-off wall types is not well supported.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. Re-evaluate the use of soil-bentonite (SB) walls based on the experience at Site R.

USACE Response: Not Adopted.

The 'Site R' soil bentonite wall was designed for the purpose of confining ground water borne contaminates, not for reducing underseepage.

b. Consider constructability, including working space and levee access, in the evaluation of wall alternatives.

USACE Response: Adopted.

**Action Taken:** Paragraph 'm' in section 5.6 of the Main Report provides proposals accepted by the Value Engineering study. Proposal 2 of the VE study recommends moving the slurry trench cutoff from the levee centerline to the area beyond the riverside, levee toe. Additional subsurface data collected during the design phase will further consider this VE proposal and allow complete consideration of constructability issues of various wall alternatives.

c. Evaluate trench stability to assess the viability of various methods.

USACE Response: Adopted.

**Action Taken:** As part of the evaluation of the Value Engineering Proposal #2, slope stability analyses of the slurry trench located riverside of the levee were on-going at the time of the IEPR. A statement to this effect was added to Section 5.3.5 of the Main Report.

d. Evaluate the use of deep soil mixing (DSM) walls as a possible wall alterative.

USACE Response: Adopted.

**Action to be Taken:** Depth of cutoffs located riverside of the levee will be 80 to 110-feet deep. Current, practical limits for DSM are 100-feet. USACE experience in the middle Mississippi shows that there are significant difficulties constructing DSM walls in the stiff, high plasticity clays and the cobbles/boulders present in the Mississippi riverine environment. New, emerging technology for wall construction such as DMM (Deep Mixing Methods), TRD (Trench Re-Mixing and Cutting Deep Wall method), and CSM (Cutter Soil Mix) be considered during the plans and specifications phase.

e. Consider the potential costs of handling and disposing of contaminated soil and groundwater for the wall selection.

USACE Response: Adopted.

**Action Taken:** The levee construction pre-dates most of the industrial development in the area and the proposed centerline location of the cutoff wall eliminates contact with contaminated soils. Costs of disposal of clean soils and an assumed percentage of contaminated soils excavated from the slurry trench are considered in the M-CASES estimate. Although the proposed centerline location of the cutoff wall eliminates contact with contaminated soils, there is a chance that contaminated groundwater will be encountered during the wall excavation. While a Phase I environmental assessment was included in the report (Appendix H), the Phase II environmental groundwater study planned for the plans and specifications phase would reveal more information on this potential. These costs would be considered in future design phases.

**6. Comment – *Medium Significance*: The assumptions and rationale used to perform the cost analysis for the LRR need to be more specific and detailed to fully understand the basis for their development.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
1. A project-specific detailed list of civil engineering and cost-estimating assumptions (for example, the assumed haul distance for borrow, type of equipment to be used, compaction factors for soil, etc.).

USACE Response: Not Adopted.

Detailed project specific engineering and cost estimating assumptions are documented in the detailed cost estimate. The decision not to show the detailed notes in the published document is based on USACE Cost Estimating guidance indicating what level of detail to include in a document out for public review. Some of this information is considered proprietary and is not to be released to the public. The cost estimating file that included the detailed assumptions was provided to the reviewers for their information.

2. Coordinate the Primavera schedule (Plate 20) with the risk analysis schedule estimates.

USACE Response: Not Adopted.

There is little to no relationship between the Primavera project schedule and the Cost and Schedule Risk Analysis. The Primavera schedule is focused more on funding availability, while the risk analysis schedule is concerned with physical construction timeframes.

3. A list describing the rationale for selecting the risk analysis and cost contingency projections.

USACE Response: Not Adopted.

All information related to the risk analysis and cost contingencies is documented in the Cost and Schedule Risk Analysis Report that was provided to the panel.

**7. Comment – *Medium Significance*: The LRR needs to address the rationale for the use of semi-pervious berms or the possibility of using other types of berm fill.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A discussion of alternative berm types (e.g., sand berm, free-draining berms, and impervious berms) and their applicability to the project.

USACE Response: Adopted.

**Action Taken:** Section D.7 of the Geotechnical Appendix was modified to include expanded discussion of alternative berm types and why they were screened from consideration.

b. A discussion of the permeability requirements for semi-pervious berm fill and the potential borrow sources for this material.

USACE Response: Adopted.

**Action Taken:** A discussion of permeability requirements of various types of berms was added to the Geotechnical Appendix (Section D.7) but the identification of potential borrow sources was not included, as acquisition of commercially-available appropriate berm fill would be a requirement for the contractor.

**8. Comment – *Medium Significance*: The subsurface exploration program supporting the seepage analysis should be expanded prior to final design to supplement the available subsurface information.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A general discussion of the future design process for development of plans and specifications, including a general identification of the need for additional subsurface information in areas where there is uncertainty regarding subsurface conditions. Such exploration should include geotechnical characterization of levee embankments along the Mississippi River.

USACE Response: Adopted.

**Action Taken:** A discussion of data gaps was added to the Main Report (Section 6.8.2) that described the need for additional subsurface information prior to final design.

**9. Comment – *Medium Significance*: It is unclear how the benefits were derived for each alternative, and the methods for performing the benefit analysis were not fully described and supported.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. Provide a detailed explanation of the three "classes" of potential outcomes (high, medium, and low).

USACE Response: Adopted.

**Action Taken:** An explanation of the three 'classes' of outcomes was explained in detail under the heading UNSATISFACTORY LEVEE PERFORMANCE AND ECONOMIC CONSEQUENCES in Section 4 of the Economic Appendix.

b. Detail the critical steps or data omitted (first-floor elevation, inventory of property by category).

USACE Response: Adopted.

**Action Taken:** A table was added to Section 3 of the Economic Appendix detailing the number and average building value of structures, by category, for each study reach (North Flank, Riverfront, and South Flank). First floor elevation data was not provided due to the large number of structures evaluated (26,864).

c. Establish the relationship of depth of flooding to percent of value damaged for unique structure (principally industrial). Provide further explanation of the steps taken to construct an aggregate stage vs. damage relationship.

USACE Response: Adopted.

**Action Taken:** The study utilized depth-damage functions developed by the Institute of Water Resources (IWR) and an explanation of these functions was added to Section 4 of the Economic Appendix. The discussion of the stage-damage relationships in Section 4 of the Economic Appendix was expanded to provide additional detail.

d. Explain the omission of categories of potentially significant damages (agriculture and future development).

USACE Response: Adopted.

**Action Taken:** Rationale for omission of potential benefit categories such as agriculture and future development was added to Section 3 of the Economic Appendix.

e. Provide further explanation of terms, their resulting development or intended purposes (probability of consequences, conditional probabilities of non-excedence, and distribution).

USACE Response: Adopted.

**Action Taken:** Further explanation of terms (development and purposes) was provided throughout report where necessary, with particular attention paid to the explanations in the Economic Appendix.

**10. Comment – *Medium Significance*: The cumulative effects analysis has been restricted to the project along with its operation and maintenance; the broader consequences of the project need to be considered.**

The panel experts recommended the following actions to resolve this comment:

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

a. A more detailed description of the types of enhanced economic development that could reasonably be expected to occur or continue once the 100-year level of protection is restored.

USACE Response: Adopted.

**Action Taken:** A discussion of the local existing land use planning strategy was added to the revised cumulative effects analysis of the Environmental Assessment (Section 7.19). A statement to this effect was also added to the Economics appendix, Section 3.

b. A discussion of ordinances, if any, enforced by local municipalities that guide development within the 100-year floodplain so that future development possibilities are better understood.

USACE Response: Adopted.

**Action Taken:** A discussion of the local existing land use planning strategy was added to the revised cumulative effects analysis of the Environmental Assessment (Section 7.19).

c. A discussion of the potential adverse impact of reducing flood risk, which could foster the incorrect public perception that the project eliminates flood risk and therefore fully protects their health, safety, and property from flooding. This discussion would need to describe a 100-year flood (1% flood) (i.e., that such a flood could occur every year or even more than once per year), explain that the USACE does not have jurisdiction over building and planning ordinances and thus does not control what may be developed within the 100-year floodplain, and clarify that there is still a significant risk of flooding in the study area even with the project in place.

USACE Response: Adopted.

**Action Taken:** A discussion that there is still flood risk even with a repaired levee, and a list of the nonstructural measures that can be taken by local municipalities and individuals to help reduce damages in the event of a flood, regardless of the percent of occurrence, was added to the revised cumulative effects analysis of the Environmental Assessment (Appendix A, Section 4.19).

d. A discussion explaining that increased or continued development is an expected consequence of the project and that, for any project, development has environmental effects. Such effects include, but are not limited to, habitat loss, changes in air quality, changes in local aesthetics, changes in noise, and changes in the socioeconomic environment that may be positive for some people, but negative for others.

USACE Response: Adopted.

**Action Taken:** A discussion explaining that increased or continued development could have negative impacts on the social, structural, natural, and economic environment and the steps or measures that are being implemented by local municipalities to help mitigate those negative impacts was added to the revised cumulative effects analysis of the Environmental Assessment (Appendix A, Section 4.19).

**11. Comment – *Medium Significance*: The Finding of No Significant Impact (FONSI) portion of the Environmental Assessment (EA) should be revised to expand on areas requiring further study where environmental effects are not completely understood.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A description of the data gaps.

USACE Response: Adopted.

**Action Taken:** A description of the data gaps was added to the Main Report in Section 6.8.2 and Section 7. In turn data gaps have been summarized in the Environmental Assessment (Appendix A, Section 1.5).

b. A description of the steps that are being or will be undertaken to fill the data gaps.

USACE Response: Adopted.

**Action Taken:** A description of the steps that are being or will be undertaken to fill the data gaps was added to the Main Report in Section 6.8.2 and Section 7. Likewise, these steps have been summarized in the Environmental Assessment (Appendix A, Section 1.5).

c. A description of how new information gathered during construction to fill these gaps will be evaluated with respect to NEPA.

USACE Response: Adopted.

**Action Taken:** A description of how new information gathered during construction to fill these gaps was evaluated with respect to NEPA and was added to Section 7 of the Main Report, and a summary of this plan for future evaluation was added to the Environmental Assessment (Appendix A, Section 1.5).

d. A contingency plan describing how the NEPA process may or will continue if new information leads to the conclusion that one or more environmental effects may indeed be significant.

USACE Response: Adopted.

**Action Taken:** A contingency plan describing how the NEPA process may or will continue if new information leads to the conclusion that one or more environmental effects may indeed be significant was added to Section 7 of the Main Report, and a summary of this contingency plan was added to the Environmental Assessment (Appendix A, Section 5.0).

e. A discussion of how unexpected and unaccounted for potential negative environmental effects that manifest after construction has commenced will be mitigated (especially with respect to the HTRW issues but including air quality, cultural resource, and hydrologic issues).

USACE Response: Adopted.

**Action Taken:** A discussion of how unexpected and unaccounted for potential negative environmental effects that manifest after construction has commenced will be mitigated (especially with respect to the HTRW issues but including air quality, cultural resource, and hydrologic issues) was added to Section 7 of the Main Report. Likewise, the plan for mitigation of such effects was summarized in the Environmental Assessment (Appendix A, Section 5.0).

**12. Comment – *Medium Significance*: The supplemental exploration program should include strength testing of embankment and shallow underlying layers to support slope stability analyses.**

The panel experts recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. Revise Plate D-2 to include approximate boring and cone penetrometer test (CPT) stationing.

USACE Response: Not Adopted.

Stationing of all exploration is already provided on the D-1 plates in Appendix D.

b. Provide the CPT data along with standard density and strength correlations.

USACE Response: Not Adopted.

The CPT exploration was only used to determine the Soil Behavior Types for evaluation of riverside blanket thicknesses. No strength interpretations of the CPT are being used.

c. Provide a more compete interpretation of the transverse geotechnical cross sections to include significant strata, entrance distances used in underseepage calculations, interpreted top layer thicknesses, and conceptual location of various remedial alternatives (including relief wells, shallow and deep cutoffs, and seepage berms).

USACE Response: Adopted.

**Action Taken:** Cross-Sections (based on LIDAR survey) were created and results of conventional and CPT exploration were superimposed on the sections. These were used to determine various distances required for the Mansur/Kaufman and Seep/W seepage analyses. Appropriate cross sections will be included in the Plans and Specifications phase.

d. Provide longitudinal interpretive geotechnical sections.

USACE Response: Adopted.

**Action Taken:** Landside and riverside fence diagrams of exploration obtained on 330-ft centers are included in the D-2 plates in Appendix D. Appropriate interpreted, geological profiles will be provided during the plans and specification phase.

e. Conduct strength testing on embankment and shallow underlying strata during supplemental geotechnical explorations.

USACE Response: Not Adopted.

Because this LRR is focused solely on addressing underseepage, strength testing of the embankment and foundation are beyond the scope of this LRR.

**13. Comment – *Medium Significance*: The relocations and potential relocation conflicts and costs need to be described in greater detail.**

The panel experts recommended the following actions to resolve this comment:

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

a. An up-to-date description of affected properties.

USACE Response: Adopted.

**Action to be Taken:** During the design phase, USACE will provide detailed right-of-way requirements drawings to the sponsor, and the sponsor will accomplish the necessary property surveys and title searches to accurately describe affected properties.

b. More detailed cost estimates on relocations so that this information can be conveyed to the sponsor.

USACE Response: Adopted.

**Action to be Taken:** During the design phase, USACE will obtain more detailed information and coordinate with utility owners to develop more detailed cost estimates on relocations and provide them to the sponsor.

c. A greater degree of review and analysis of the impacts of the relocation requirements.

USACE Response: Adopted.

**Action to be Taken:** During the design phase, USACE will obtain more detailed information and coordinate with utility owners to determine how these conflicts will impact proposed project features.

d. An evaluation of the costs of relocation and a comparison of that effort with a duration/time estimate for inclusion in the project schedule.

USACE Response: Adopted.

**Action to be Taken:** An evaluation of both the costs and schedule impacts of utility relocations will be addressed early in the preconstruction engineering and design phase. The construction schedule currently spans nine years, and the project will be built in phases. This will allow adequate time for coordination of relocations prior to construction of any given segment.

**14. Comment – *Low Significance*: Operations, maintenance, repair, replacement, and rehabilitation (OMRRR) considerations have not been fully described.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. Roles and responsibilities with specific requirements for inspections by the local sponsor during storm and seismic events.

USACE Response: Adopted.

**Action to be Taken:** The report states that the sponsor is responsible for OMRRR for the design deficiency correction project in accordance with an OMRRR manual, and that the manual will include design requirements. The sponsor already performs inspections during storm events and USACE will include in the future OMRRR manual the requirement that the sponsor inspect their entire levee system after major seismic events.

b. A discussion of the need to coordinate with USACE staff on inspection requirements so the project is included in the USACE LIS Program.

USACE Response: Adopted.

**Action Taken:** The LRR was revised to state that the MESD levee is in the USACE Levee Inspection Program, and the requirements for inspections are now described in the report (Main Report Section 5.1.2).

**15. Comment – *Low Significance*: The project operation manual should include a recommended levee inspection and monitoring plan for local sponsors for periods when there is a high water event.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A description of the high water inspection plan that would be developed for the project operational manual. The plan should be directed at a level for working level members of the local sponsor's staff and should be focused on conditions/areas that are identified as potential failure modes based upon design considerations.

USACE Response: Not Adopted.

A high water inspection plan will be included in one or more of the O&M manuals but it is not appropriate to include this information in the LRR. The LRR already includes a description of the Corps of Engineers Flood Control Regulations for Maintenance and Operation of Flood Control Works and a summary of the results of annual levee inspections conducted by USACE in cooperation with the sponsor. The regulations are well known and have been used for many years by the sponsor management and staff.

b. Implement a procedure that documents the need for USACE geotechnical engineers to inspect the project during high water conditions to verify design assumptions. The procedure should be developed by design engineers and should focus on areas of uncertainty in the design that should be verified during high water events. These inspections should be documented by written memorandums that can be maintained by the USACE to provide a basis for evaluating the ongoing performance of the levee system.

USACE Response: Adopted.

**Action Taken:** A procedure is already in place for USACE geotechnical engineers to inspect the project both during high water events and during dry periods to verify design assumptions. That procedure will continue in the future and will include any design deficiency project features that are implemented.

**16. Comment – *Low Significance*: USACE should use the current flood profiles for the hydraulic analysis of the flank levees instead of the Mississippi River backwater curves.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. Provide details and further explanations of the analysis and reasoning behind the use of Mississippi River backwater curves over the current flood profiles in the LRR.

USACE Response: Adopted.

**Action Taken:** Discussion was added to Appendix C, Section C.3 to clearly state the reason for use of Mississippi River backwater curves for the flank levees.

b. Develop current flood profiles for the flank levees to fully evaluate levee heights.

USACE Response: Not Adopted.

The project scope is limited to construction and design deficiencies. Levee heights must be evaluated based on original design profiles. Discussion was added to the Main Report Section 2 "Study Purpose and Scope" to clarify design and construction deficiencies.

c. Validate that the levee heights exceed the 100-year flood protection planning requirements.

USACE Response: Not Adopted.

This report is limited to an examination of construction and design deficiencies. However, the levee heights were validated to be at or above the original net levee grade.

d. Clarify the basis of the design criteria relative to net levee grades for all levees within the system.

USACE Response: Adopted.

**Action Taken:** Corps design criteria relative to net levee grades is contained in the Engineer Manuals, Division Regulations and Technical Memoranda listed in the report. In addition, Section 5.1.4.3 of the report (Hydrology and Hydraulic Conditions) includes discussion of criteria used for the design of the MESD design deficiency correction project. Additional information about the constructed net levee grade of all the levees in the system was added to the Main Report in Section 2.

e. Provide a summary of the required net grades by levee segment or station.

USACE Response: Adopted.

**Action Taken:** The design net levee grade profile and current levee survey are provided in Appendix E - Design.

f. Verify that the levees meet or exceed the required grade by levee segment or station.

USACE Response: Adopted.

**Action Taken:** Narrative that the current levee survey is at or exceeds net levee grade is provided in Appendix E - Design.

**17. Comment – *Low Significance*: The recommended design should be refined prior to construction with regard to relief well penetration and spacing.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A description of the optimization procedure for each area where relief wells would be employed. This procedure should conform to the requirements of the EM-1110-2-1914 and should be done prior to final design of the relief well system.

USACE Response: Not Adopted.

While greater penetration rates allow larger well spacing to be utilized, many times this larger well spacing advantage is eliminated by the physical length of the well reach being analyzed. The larger well spacing must be revised downward in order to install an integer number of relief wells that are spaced to fit the topography.

**18. Comment – *Low Significance*: The plan formulation process should describe the trade-off analysis used to select the tentative recommended plan.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A table or list of pertinent information that shows, for each decision segment, the correlation between the identified problems/opportunities and the appropriateness of the resolution to each.

USACE Response: Not Adopted.

A summarizing table or list of pertinent information was not added to the report. However, additional general discussion on the trade-off analysis was added to the Main Report (Section 5.9).Existing information in the plan formulation appendix on the alternatives considered for each decision segment, drawings showing these alternatives, and cost estimates for these alternatives by decision segment supports the selection of the recommended plan.

**19. Comment – *Low Significance*: Several design assumptions or local conditions need to be resolved during final design.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A more detailed description of any work done to date to address these site uncertainties, or descriptions of how each condition will be evaluated in the future prior to construction.

USACE Response: Adopted.

**Action Taken:** A summary of information about abandoned wastewater pipes and culverts observed during the 1993 flood was added to the Geotechnical Appendix, Sections D.6 and D.7.

**20. Comment – *Low Significance*: The LRR does not address all real estate interests and requirements and therefore does not allow for full comparison across all alternatives.**

The panel recommended the following actions to resolve this comment:

To resolve these concerns, the report would need to be expanded to include the following:
a. A summary (roll-up) document of major regions that shows a side-by-side comparison of all of the alternatives with all the related cost categories clearly identified. For clarity, footnotes explaining in detail the cost categories should be included.

USACE Response: Not Adopted.

The recommended plan was selected based on many criteria, with the real estate costs included in the total project cost criterion. The best overall plan was selected for each decision segment.

b. A coordinated schedule with the RE costs to ensure that the RE effort matches time projections for the project.

USACE Response: Not Adopted.

Past experience shows that acquisition of real estate required for a large project generally takes one year. Condemnation of property can also take as much as a year. The acquisition of Right-of-Way timeframe will remain at one year.

c. Correlation of the RE cost projections with the statements in Appendix F, Section 11 to ensure consistency in presentation.

USACE Response: Adopted.

**Action to be Taken:** Relocation assistance is not anticipated to be needed. However, during the design phase, Real Estate requirements will be refined and the need to relocation assistance will be reconsidered.