

## **FINAL TECHNICAL MEMORANDUM**

**TO:** Jill Townley, Project Manager  
Minnesota Department of Natural Resources

**FROM:** Suresh Hettiarachchi, PE Water Resources

**DATE:** May 16, 2014

**SUBJECT:** Adequacy of Hydrology and Hydraulic Modeling Completed for the Fargo-Moorhead Flood Risk Management Project.

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The Minnesota Department of Natural Resources (MNDNR) is preparing a State Environmental Impact Statement (EIS) as part of the State environmental review process under the Minnesota Environmental Policy Act (MEPA) for the Fargo-Moorhead Flood Risk Management Project (Project), which is in addition to previous federal environmental review on the Project completed by the US Army Corps of Engineers (USACE) in the 2011 Final Feasibility Report and Environmental Impact Statement (FFREIS). A hydrologic and hydraulics (H and H) modeling analysis was completed that provides extensive data and information on the existing and predicted flooding conditions for the Project. The H and H models provide a basis for much of the EIS analysis of the Project. This technical memorandum provides a brief summary and adequacy review of the H and H modeling analysis as currently completed for the Project. The MNDNR has reviewed this technical memorandum and concurs with its findings.

This technical memorandum is intended to address the overall adequacy of the H and H models used for project design, and as a data source for analyses necessary for completion of the State EIS. This technical memorandum does not constitute a detailed review or quality assurance of the H and H models. As the models are very complex, it is not practical to conduct an independent review of all associated elements. A discussion on review of information provided by the H and H models and other methods of analysis is also included with this technical memorandum.

### **Review of information available related to Hydrology and Hydraulics**

The Flood Diversion Board of Authority (project sponsors), their consultant team, along with the USACE have developed and refined hydrologic and hydraulic models for the Project for over five years. The level of detail and the extent of modeling completed are very thorough and complex. The hydrologic modeling includes use of watershed-wide gage data and detailed HEC-HMS models that were created for each of the contributing watersheds. The HEC-RAS model used for hydraulic analysis of the Project features was updated to route hydrographs in unsteady state mode and includes explicit modeling of floodplain storage. The model has all of the major rivers and local drains that are tributaries to the Red River of the North starting from the upper end of the River at Lake Traverse, to the city of Grand Forks, North Dakota at the downstream end. The HEC-RAS model also includes all of the hydraulic control structures and features related to the Project along with a majority of the bridges and channel crossings

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throughout the river system. Inflow hydrographs are loaded into the unsteady state HEC-RAS model based on hydrographs developed from the distributed gage data or by connecting the output from the HMS models at the appropriate boundary conditions in the HEC-RAS model.

The HEC-RAS unsteady flow model was calibrated to the 2009 Flood, and verified by comparing the results to the 1997, 2006, and 2010 events using discharge and stage hydrographs and high water marks. The models were built by a team of consultants and USACE staff allowing for continual checks and balances during model development and refinement. The 2011 FFREIS Hydraulics appendices indicate that a comprehensive internal quality assurance/quality control (QA/QC) procedure was followed to fully evaluate model details. The following list of documents found in the FFREIS (located at <http://www.fmdiversion.com/eis.php>) lists the QA/QC steps that have been followed during the development and refinement of the model:

- Appendix B, Section B.3.0
- Attachment 5 (Consultant's Report), Appendix B (Section B6.0 and Exhibit H).
- Attachment 5 (Consultant's Report), Appendix C (Section 2.15 and Exhibit 5).

The models are subjected to continual refinement as additional information is obtained or as new questions are raised. For example, the domain of the HEC-RAS model was extended downstream after initial results suggested more significant adverse downstream impacts from a diversion than initially anticipated. The latest updates, referred to as Phase 7 conditions, reflect the alignment alternative selected based on the Value Engineering Option 13 A (PFSAA Report October 2012). These updates include gates at the inlet control structures to the diversion channel as well as in-town protection to the 35-foot stage. The Document Summary Memorandum which is attached to this technical memorandum (Attachment A) includes a summary of all the updates that have been done to the models since the Phase 4 updates. Appendix B of the Project Study Phase 4 Report (Houston Engineering April 2011) includes detailed descriptions of the model development at Phase 4 including changes made to incorporate floodplain storage, upstream staging, and downstream impacts using the unsteady state HEC-RAS models.

Following is a list of the current documents that were reviewed to evaluate the hydrology and hydraulics of the Project as part of the State EIS:

Barr Engineering, Inc. 2014. Memorandum – Summary of Reports and Memoranda Documenting Revisions and Updates of the HEC-RAS Model Since Phase 4. Prepared for USACE and Houston Moore Group. February 28, 2014.

Barr Engineering, Inc. 2011. Red River Diversion Fargo – Moorhead Metro Flood Risk Management Project, Feasibility Study, Phase 4 – Appendix F – Hydraulic Structures. Prepared for USACE and Cities of Fargo, ND and Moorhead, MN. February 28, 2011.

Barr Engineering, Inc. 2011. Red River Diversion Fargo – Moorhead Metro Flood Risk Management Project, Feasibility Study, Phase 4 – Appendix F – Hydraulic Structures.

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Exhibit A – Background Hydrologic Information. Prepared for USACE and Cities of Fargo, ND and Moorhead, MN. February 28, 2011.

Houston Engineering, Inc. 2011. Red River Diversion Fargo – Moorhead Metro Flood Risk Management Project, Feasibility Study, Phase 4 – Appendix B – Hydraulics Existing Conditions. Prepared for USACE and Cities of Fargo, ND and Moorhead, MN. April 11, 2011.

Houston Engineering, Inc. 2011. Red River Diversion Fargo – Moorhead Metro Flood Risk Management Project, Feasibility Study, Phase 4 – Appendix B – Hydraulics With – Project Conditions. Prepared for USACE and Cities of Fargo, ND and Moorhead, MN. April 11, 2011.

USACE. 2011. Final Feasibility Report and Environmental Impact Statement Fargo-Moorhead Metropolitan Area Flood Risk. July 2011.

USACE. 2011. Final Feasibility Report and Environmental Impact Statement Fargo-Moorhead Metropolitan Area Flood Risk – Appendix B Hydraulics. July 2011.

USACE. 2011. Supplemental Draft Feasibility Report and Environmental Impact Statement Fargo-Moorhead Metropolitan Area Flood Risk Management – Appendix A-2 Hydrology. April 2011.

USACE. 2012. Review Plan – Overall FMM Project, Engineering and Design Phase and Construction Phase. Fargo-Moorhead Metropolitan Area Flood Risk Management Project. June 2012.

USACE. 2013. Supplemental Environmental Assessment – Design Modifications to the Fargo Moorhead Metropolitan Area Flood Risk Management Project. September 2013.

USACE. 2013. Supplemental Environmental Assessment – Hydraulics and Hydrology Appendix D – Fargo Moorhead Metropolitan Area Flood Risk Management Project EA Document. May 2013.

The recently completed Halstad Upstream Retention Study (HUR) takes advantage of the H and H models to evaluate impacts of watershed-wide distributed storage on peak flow rates and volumes in the Red River. The HEC-HMS models were used to develop flow hydrographs with storage that were then routed through the HEC-RAS model to evaluate impacts along the Red River.

Along with the above summary of modeling completed, the following are the considerations for the statement of adequacy of H and H modeling related to analysis for the State EIS and the appropriate level of review for available data:

- The level of detail and extent of the models completed for the Project are very thorough.

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- The type of models used is appropriate for the purpose of the analysis and use of results generated.
- The area specific Hydrology and Hydraulics models have been used for various localized analysis projects by project sponsors and local watershed districts, which implies independent review of the models.
- The model has been calibrated to different datasets and different runoff conditions, suggesting that the level of detail and underlying assumptions are adequate and appropriate.

Therefore, it is reasonable to conclude that the Hydrology and Hydraulics models developed for the Project are adequate and appropriate to evaluate the Project as needed for the State EIS. It is important to note the following:

- This assessment is based on a general, high-level review of the HEC-RAS models and their boundary conditions, along with review of available reports about the Project.
- This statement of adequacy does not imply that all model runs and analysis are now complete.

### Discussion on the Accuracy of Results Obtained from the Models and Information Provided

The State EIS is dependent on available information and information provided by others such as the project sponsors and the USACE. Therefore, the first step of the QA/QC process will have to occur on the side of the project sponsors or the USACE as the source of that information. As this information is being provided by professional engineers and scientists, it is reasonable to assume that the information that is transmitted and available has gone through a QA/QC process consistent with the requirements specific to the Project and meets the standard of care appropriate for this Project. The USACE QC guidelines for civil projects along with the project specific QC guide are included as attachment B and C respectively.

For the MNDNR State EIS, there are experienced professional engineers and scientists who are reviewing the available Project information from multi-disciplinary perspectives which generate a matrix of analyses that may reveal inconsistencies or concerns for the information that is provided in the State EIS. Also, the documents that are generated for the State EIS are reviewed by technical staff with the appropriate technical expertise and significant experience to provide an added level of QA/QC.

With the two stage review of information generated for the Project, there is a reasonable level of confidence that the information included in the State EIS document will be valid and accurate. A typical quality review procedure used to verify the accuracy and adequacy of the information received includes:

1. Initial review of QA/QC procedures specific to the Project
2. Verification the QA/QC procedure was followed with each submittal
3. Include more than one person to review the submittal after its receipt
4. Have the subject matter expert review the submittal
5. Circulate the submittal to relevant cross disciplinary teams so they can provide an additional level of review as well as verify that it is consistent with the latest Project elements.

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Overall, the extent and completeness of the information available and provided for the Project is significant. Project elements have changed since some of the reports and information were developed, however, and continue to change during the environmental review process, creating the need to review the data for relevancy and apply the relevant information to the current Project design. There are also new results generated to answer questions that come up during the environmental review process. Appropriate QA/QC procedures should be followed and documented as applicable to the updates and new information that is generated in relation to the Project to further ensure data quality.

**Attachment A**

Summary of modeling updates completed since Phase 4

(Provided by BARR Engineering)

**Attachment B**

USACE Civil Works Quality Control Guide

**Attachment C**

USACE 2012 Review Plan – Overall FMM Project

## Memorandum

**To:** Aaron Buesing (USACE); Gregg Thielman, Greg Thompson, and Lyndon Pease (HMG)  
**From:** Rita Weaver, Omid Mohseni, Brandon Barnes, and Miguel Wong (Barr Engineering Co.)  
**Subject:** Summary of reports and memoranda documenting revisions and updates of the HEC-RAS model since Phase 4  
**Date:** February 28, 2014  
**Project:** Independent Technical Review of HEC-RAS model for Fargo-Moorhead Diversion Project (Phase 8 Step 1 review)  
**c:** Lee Beauvais (HMG)

### Documentation summary background

The HEC-RAS unsteady flow model of the Red River of the North (RRN) is a key component of the Fargo-Moorhead (FM) Metropolitan Area Flood Risk Management Project as it is used for both the evaluation of floodplain impacts upstream and downstream of the project area and for engineering design purposes. The model is also anticipated to serve as the platform for developing the project operational plan. Modifications have been made to the HEC-RAS model over the past four years through the different phases of the project. The majority of these modifications were made to add more detail to the model or to optimize the design of the diversion channel and other project features.

The HEC-RAS model modifications have been documented in a number of reports and memoranda completed at the end of each phase or other project milestones. This memorandum summarizes the documentation for each phase that describes the modifications to the HEC-RAS geometry, from Phase 4 through Phase 7.1. This summary is not intended to repeat what is in the reports and memoranda, but to provide a review of the degree of documentation.

### Phase 4 documentation

Appendix B of the Fargo-Moorhead Metro Flood Risk Management Project Feasibility Study Phase 4 report (Houston Engineering, April 2011) provides a thorough overview of the development and calibration of the existing-conditions hydraulic model of the RRN. Hydraulic models available for the RRN were used to start development of this existing-conditions model, and a summary of the previous

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modeling efforts and the new data collected for this modeling effort is included in Appendix B of the Phase 4 report.

All data sources, the model datum, and geometry parameters including boundary conditions, roughness coefficients, and weir coefficients are included in Appendix B. In addition to model geometry information, the model documentation includes information regarding calibration tolerances, simulation start and end dates, computation options and tolerances, and hydrograph development. Model calibration for the 2009 flood event and model verification for the 1997, 2006, and 2010 events are also discussed in detail.

Appendix C of the Phase 4 documentation (Moore Engineering, April 2011) includes the modifications made to the existing-conditions hydraulic model in order to represent proposed diversion options. The documentation covers two diversion options: the Locally Preferred Plan (LPP), with the diversion channel on the North Dakota side of Fargo-Moorhead, and the Federally Comparable Plan (FCP), with the diversion channel on the Minnesota side of Fargo-Moorhead. Appendix C also summarizes the documentation of hydraulic analyses on different diversion options completed prior to Phase 4.

A cursory QA/QC of the Phase 4 models was completed as part of Phase 4. It is summarized in Appendix B, Exhibit H (Houston Engineering, February 2011) and Appendix C, Exhibit 5 (Moore Engineering, 2011) of the Phase 4 report. QA/QC comments were revisited as part of this summary to determine if comments had been addressed between Phase 4 and Phase 7.1. The comments are summarized in Attachment 1 to this memorandum, with potentially outstanding comments highlighted.

### **Phase 5 modifications**

Geometry modifications made as part of Phase 5 are summarized in the Feasibility Study, Phase 5 Hydraulic Analysis and Addition Studies report (Moore Engineering, October 2011). These modifications were all made in the Phase 4 existing-conditions and with-project hydraulic models (LPP only). Changes to the geometry include truncating cross sections and adding storage areas, modifying effective and ineffective flow areas, changing roughness coefficients, adjusting the overbank reach lengths, and applying new weir coefficients to lateral structures and storage connections.

The majority of the geometry modifications made in Phase 5 were intended to improve model calibration. In Phase 4 the model calibration favored matching discharges, while in Phase 5 the model calibration favored matching stages.

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Additional geometry modifications were made to the with-project model. Different with-project model hydrographs were evaluated by using different operational schemes for the gates at RRN and Wild Rice River control structures. Two scenarios for gate operations are discussed in the documentation. The primary objectives of these scenarios were 1) to match the results of the Phase 4 models after the Phase 5 geometry modifications were made, and 2) to evaluate the feasibility of reducing staging upstream of the diversion.

### **Phase 6 modifications**

The FM Diversion Post-Feasibility Southern Alignment Analysis (PFSAA): VE-13, North of Wild Rice River, South of Oxbow report (Houston-Moore Group, 2012) briefly summarizes the Phase 6 geometry modifications. Phase 6 modifications were made to the Phase 5 version of the hydraulic model, and the LPP was at this time considered the Federally Recommended Plan (FRP). The document mentions that changes to the geometry along the diversion channel were made to better define hydraulic interactions, and that changes were made to the storage areas in the upstream staging area to improve conveyance. No additional detail is provided on the Phase 6 geometry modifications.

Using the Phase 6 hydraulic model, four alternative alignments along the southern edge of the project area were evaluated, aiming to reduce project impacts to the existing floodplain and to lower construction costs. The PFSAA report covers the geometry modifications required to represent each of the four alternative alignments.

### **Phase 7 modifications**

The alignment alternative selected after the release of the PFSAA report in October 2012 was Value Engineering 13 Option A (VE13A). With this alignment, the southern portion of the diversion channel is shifted further north to eliminate the need for the Wolverton Creek structure and to decrease the length of the tieback embankment. This alignment resulted in a reduction in the length of the diversion channel between the inlet structure and the RRN and also eliminated Storage Area 1. The storage areas along the new alignment were modified to better characterize the floodplain. These modifications are discussed in detail in Appendix D, Hydrology and Hydraulics of the Environmental Assessment document (USACE, 2013), and the PFSAA report.

In addition to incorporating the VE13A alignment into the hydraulic model, there were other minor modifications made to the model as part of Phase 7 updates. These modifications are summarized in

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Appendix D of the Environmental Assessment document and include the addition of gates to the inlet control structure and the provision of in-town protection to 35 feet.

### **Phase 7.1 modifications**

Geometry modifications made in Phase 7.1 are summarized in the Technical Memorandum of Unsteady HEC-RAS Modeling Phase 7.1 (Houston-Moore Group, 2013). These modifications were made to the Phase 7 hydraulic model. The focus of the Phase 7.1 modeling was to add detail to the model in preparation of the Phase 8 modifications to the model hydrology.

Modifications to the geometry of the existing-conditions and with-project models included the addition of culverts or ditches between storage areas to allow for drainage after the flood event; cross sections truncated and converted to storage areas to better calibrate water surface elevations near Grand Forks; and the use of as-built plans to better define culverts and ditches near the proposed project. Modifications made to the with-project model included geometry changes to bridges over the diversion; updates to several diversion inlets; updates to in-town emergency and permanent protection measures; and incorporation of the updated proposed levee design around Bakke, Oxbow, and Hickson. The documentation includes detailed information and maps discussing these geometry modifications.

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*References:*

Houston Engineering, Inc.; Moore Engineering, Inc.; and Barr Engineering Co. "Fargo-Moorhead Metro Flood Risk Management Project Feasibility Study, Phase 4, Appendices B". April 19, 2011.

Houston Engineering, Inc. "Fargo-Moorhead Metro Flood Risk Management Project, Feasibility Study, Phase 4, Appendix B – Hydraulics Existing Conditions. Exhibit H – Model Peer Review and Model QA/QC Measures" February 28, 2011.

Houston-Moore Group. "Draft Technical Memorandum, Unsteady HEC-RAS Modeling Phase 7.1" November 20, 2013.

Houston-Moore Group. "FM Diversion Post-Feasibility Southern Alignment Analysis: VE-13, North of Wild Rice River, South of Oxbow". October 10, 2012.

Moore Engineering, Inc.; Houston Engineering, Inc.; and Barr Engineering Co. "Fargo-Moorhead Metro Flood Risk Management Project Feasibility Study, Phase 4, Appendices C". April 19, 2011.

Moore Engineering, Inc. "Fargo-Moorhead Metro Flood Risk Management Project, Feasibility Study, Phase 4, Appendix B – Hydraulics With-Project Conditions. Exhibit 5 – QA/QC Comments and Responses" February 28, 2011.

Moore Engineering, Inc.; Houston Engineering, Inc.; and Barr Engineering Co. "Feasibility Study, Phase 5 Hydraulic Analysis and Addition Studies". October 3, 2011.

U.S. Army Corps of Engineers. "Fargo-Moorhead Metropolitan Area Flood Risk Management Project, Environmental Assessment Document". September 2013.

# ATTACHMENT B

CECW

DEPARTMENT OF THE ARMY  
U.S. Army Corps of Engineers  
Washington, D.C. 20314-1000

EC 1165-2-214

Circular  
No. 1165-2-214

15 December 2012

EXPIRES 15 DECEMBER 2014  
Water Resources Policies and Authorities  
CIVIL WORKS REVIEW

1. Purpose. This Circular establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and Operation, Maintenance, Repair, Replacement and Rehabilitation (OMRR&R). It provides the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation, and operations and maintenance documents and work products. This EC puts quality on equal footing with cost and schedule compliance. It presents a framework for establishing the appropriate level of independence of reviews as well as detailed requirements, including documentation and dissemination. This circular addresses OMB peer review requirements under the "Information Quality Act" and the Final Information Quality Bulletin for Peer Review by the Office of Management and Budget (referred to as the "OMB Peer Review Bulletin"). It also provides guidance for the implementation of both Sections 2034 and 2035 of the Water Resources Development Act (WRDA) of 2007 (Public Law (P.L.) 110-114).
2. Applicability. This circular is applicable to all HQUSACE elements, major subordinate commands (MSC), districts, laboratories, centers of expertise and field operating activities having civil works planning, engineering, design, construction; and operations & maintenance (O&M) responsibilities.
3. Distribution Statement. Approved for public release; distribution is unlimited.
4. References and Definitions. References are at Appendix A and a Glossary is included after Appendix G.
5. Policy.
  - a. It is the policy of USACE that all of its planning, engineering and scientific work will undergo an open, dynamic, and rigorous review process. Technical, scientific and engineering information that is relied upon to support recommendations in decision documents or form the basis of designs, specifications, and/or O&M requirements will be reviewed to ensure technical quality and practical application.

b. Review approaches will be scalable and customized for each effort, commensurate with the level of complexity and relative importance of the actions being supported. All decisions on the types and scopes of review required on a particular product will be risk-informed, as described in paragraph 15 below, and documented.

c. Depending on the particular circumstances, reviews may be managed entirely within USACE or in various combinations with external parties. In cases requiring the most independence, the management of the review will be performed by an organization other than USACE and will involve independent experts. Commanders must be actively involved in establishing effective review approaches for all work products. The quality management procedures of each major subordinate command, as contained in their Quality Management Plans (QMPs), shall comply with the principles of this Circular.

d. All civil works planning, engineering, and O&M products must undergo review. As illustrated in Figure 1, all products shall undergo District Quality Control/Quality Assurance (DQC), described in paragraph 8 below. A subset of these work products will undergo Agency Technical Review (ATR), described in paragraph 9, below. Smaller subsets of the ATR group will undergo one or both types of Independent External Peer Review (IEPR – See Glossary) described in paragraphs 10 through 12 below. For clarity, Policy Compliance Review and Legal Certification are not shown.

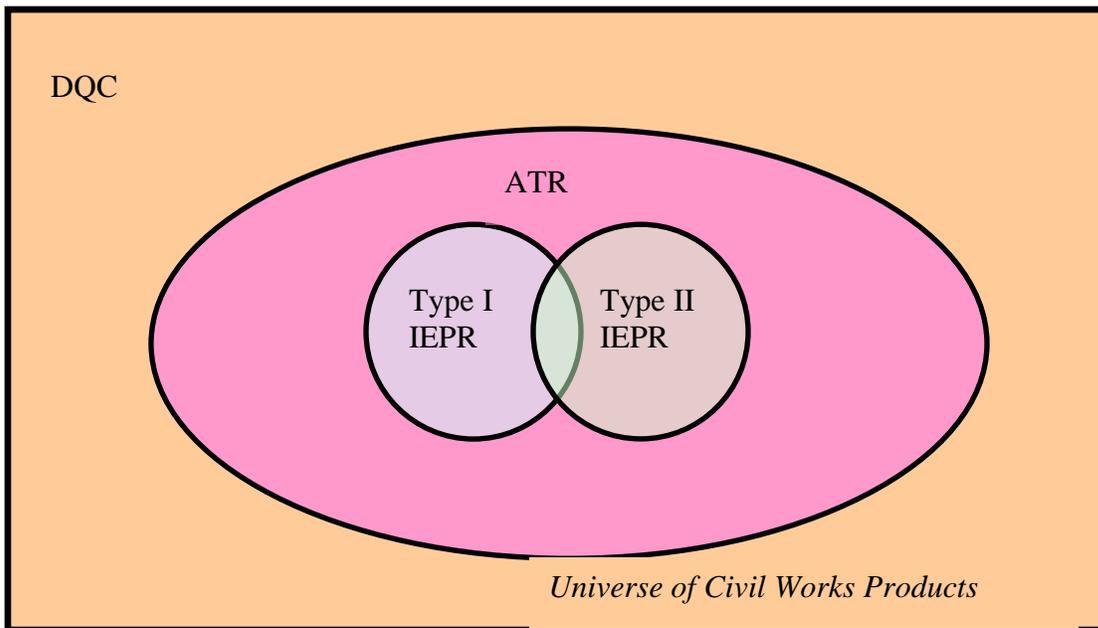


Figure 1 – Universe of Civil Works Products

6. Background.

a. The goal of the USACE Civil Works program is always to 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. Over the past few years, USACE has recognized that its

Civil Works review processes, while generally effective, needed to be strengthened. The National Research Council (NRC) report, *Review Procedures for Water Resources Project Planning*, (NRC 2002); the report, *Decision-Making Chronology for the Lake Pontchartrain & Vicinity Hurricane Protection Project*, (2008); the Interagency Performance Evaluation Taskforce final report, *Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System*, (2009); and the National Research Council report, *The New Orleans Hurricane Protection System, Assessing Pre-Katrina Vulnerability and Improving Mitigation and Preparedness* (2009) clearly show the importance of external peer review in improving USACE plans, projects and programs.

b. The USACE review process is based on a few simple but fundamental principles:

(1) Peer review is key to high quality decision and implementation documents. Reviews have significantly contributed to improved quality of work in the planning, design, and construction of projects;

(2) Reviews shall be scalable, deliberate, life cycle and concurrent with normal business processes;

(3) A review performed outside the “home” district, shall be completed on all decision and implementation documents. For other products, a risk-informed decision, as described in paragraph 15 below, will be made on whether to perform such a review;

(4) Selection of review panel members for Independent External Peer Review efforts will adhere to the National Academy of Science (NAS) Policy on Committee Composition and Balance and Conflicts of Interest, which sets the standard for “independence” in review process and complexity in a national context; and

(5) Consistent review policy shall be applied to all CW work products.

## 7. Conduct of Review.

a. Review Plans. The Review Plan (RP) is the lynchpin to ensure product credibility and accountability. The RP is also the basis for our compliance with the Information Quality Act requirement to ensure and maximize the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency. The Review Plan describes the scope of review for the current and/or upcoming phase of work (Feasibility, PED, construction, etc) and is a component of the Quality Management Plan (QMP) in the Project Management Plan (PMP) or Program Management Plan (PgMP). All appropriate levels of review (DQC, ATR, BCOE, IEPR and Policy and Legal Review) will be included in the Review Plan and any levels not included will require documentation in the Review Plan of the risk-informed decision not to undertake that level of review (as discussed in paragraph 15 below). The MSC Commander’s approval of the RP is the essential first step in product accountability and is required to assure that the plan is in compliance with the principles of this Circular and the MSC QMP and that all elements of the command have agreed to the review strategy. Like the PMP, the RP is a living document and must be kept up-to-date to

reflect the proper scale and scope of the anticipated reviews. It is the responsibility of the Project Manager to implement the RP and validate the execution and appropriate documentation of each step.

(1) The Review Plan is the primary opportunity to scale reviews appropriate to project size, level of complexity, and level of risk throughout its life cycle. Together with the “Charge” discussed in paragraph 7.c., below, the RP shall identify the most important skill sets needed in the reviews (dictating the number of reviewers on the panel) and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the individual project.

(2) The PMP or PgMP must list all review requirements, costs and schedules as integrated features of the overall project execution. To the maximum extent practicable, reviews shall be scheduled and conducted early in the process to avoid or minimize any delays in study or project completion. This is particularly pertinent in the case of independent external peer reviews. The following guidance is essential to timely review:

(a) The project budget shall include adequate funds for all necessary reviews.

(b) The project schedule shall provide sufficient time for all reviews at the appropriate points in the schedule.

(c) For decision documents, all required reviews, with the exception of the USACE policy compliance review, shall be completed before the District Commander signs the report. The USACE policy compliance review shall be completed before the Chief of Engineers signs the report.

(d) In developing a RP, the home district shall provide an opportunity for public comment by posting the approved RP on its public website. This is not a formal comment period and there is no set timeframe for the opportunity for public comment. If and when comments are received, the PDT should consider them and decide if revisions to the review plan are necessary. This engagement will ensure that the peer review approach is responsive to the wide array of stakeholders and customers, both within and outside the Federal Government.

(e) Project managers shall insure that the P-2 schedule for the project identifies the required activities for both a Type I IEPR and a Type II IEPR including any meetings to be held with the project team and the independent reviewers. The P-2 schedule shall allot funding for the various organizations involved in the review (ATR team, RMO, IEPR contract, etc). The activities shall be clearly defined and scheduled.

(3) See Appendix B for further discussion of RPs.

b. Review Management Organization. The management of a review effort is a critical factor in assuring the level of independence of the review, as required by law, USACE policy, or both. With the exception of District Quality Control/Quality Assurance, all reviews shall

be managed by an office outside the home district and shall be accomplished by professionals that are not associated with the work that is being reviewed. The USACE organization managing a particular review effort is designated the Review Management Organization (RMO) for that effort. Different levels of review and reviews associated with different phases of a single project can have different RMOs.

c. Charge. When preparing to initiate review of a USACE product, the “charge” to the reviewers on both the ATR teams and IEPR panels will contain the instructions regarding the objective of the review and the specific advice sought. Review should be conducted to identify, examine, and comment upon assumptions that underlie analyses (i.e. public safety, economic, engineering, environmental, real estate, and others) appropriate to the “charge,” as well as to evaluate the soundness of models and analytic methods. Panels should also be able to evaluate whether the interpretations of analyses and conclusions are reasonable. To provide effective review, in terms of both usefulness and credibility of results, the charge should give reviewers the flexibility to bring important issues to the attention of decision makers. However, reviewers should be explicitly instructed in the charge to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on USACE work products. The RMO is responsible for preparing the charge.

d. Documentation and Response.

(1) DrChecks<sup>sm</sup>. DrChecks<sup>sm</sup> will be the official system for the continuity of the review record. DrChecks<sup>sm</sup> will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. MSC and district Quality Manuals will establish procedures for documenting DQC.

(2) Publishing comments and responses to IEPR. Regardless of whether or not the views expressed in the IEPR Report are adopted, the home district, with assistance from the RMO, shall prepare a written proposed response to the report, detailing any actions undertaken or to be undertaken in response to the report, and the reasons those actions are believed to satisfy the key concerns stated in the review report (if applicable). All Issues in the IEPR must be addressed. The proposed response will be coordinated with the MSC District Support Teams and HQUSACE to ensure consistency with law, policy, project guidance, ongoing policy and legal compliance review, and other USACE or National considerations.

(a) For decision documents presented to the Deputy Commanding General of Civil and Emergency Operations (DCG-CEO) for approval, IEPR (see paragraph 11) comments and responses will be discussed at the meeting with an IEPR panel or Outside Eligible Organization (OEO) representative in attendance. Upon satisfying any concerns, HQUSACE will determine the appropriate command level for issuing the formal USACE response to the IEPR Review Report. When the USACE response is issued, the district shall disseminate the final IEPR Review Report, USACE response, and all other materials related to the review on its website and include them in the applicable decision document. Chief of Engineers' reports for decision documents that undergo Type I IEPR shall summarize the IEPR Review

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Report and provide full USACE responses to each concern raised by the IEPR panel. This documentation will become a critical part of the review record and will be addressed in recommendations made by the Chief of Engineers.

(b) IEPR comments and responses pertaining to the design and construction activities (see paragraph 12) shall be summarized in a report, reviewed and approved by the MSC and posted on the home district website.

(c) See Appendix E for IEPR Type II documentation and reporting requirements.

#### 8. District Quality Control/Quality Assurance.

a. All work products and reports, evaluations, and assessments shall undergo necessary and appropriate District Quality Control/Quality Assurance (DQC). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the responsible MSC; product issues identified via DQC should be resolved prior to ATR and IEPR. The DQC of products and reports shall also cover any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products and any in-kind services provided by local sponsors.

b. DQC is the backbone of the Corps' quality process. It is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). Reliance on subsequent levels of review by external teams is not an acceptable substitute for DQC. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc.

(1) Quality checks and reviews occur during the development process and are carried out as a routine management practice. Quality checks may be performed by staff responsible for the work, such as supervisors, work leaders, team leaders, designated individuals from the senior staff, or other qualified personnel. However, they should not be performed by the same people who performed the original work, including managing/reviewing the work in the case of contracted efforts.

(2) PDT reviews are performed by members of the PDT to ensure consistency and effective coordination across all project disciplines. Additionally, the PDT is responsible for a complete reading of any reports and accompanying appendices prepared by or for the PDT to assure the overall coherence and integrity of the report, technical appendices, and the recommendations before approval by the District Commander.

c. DQC efforts will include the necessary expertise to address compliance with published Corps policy. When policy and/or legal concerns arise during DQC efforts that are not readily and mutually resolved by the PDT and the reviewers, the district will seek immediate issue resolution support from the MSC and HQUSACE in accordance with the procedures outlined in Appendix H, Amendment #1, ER 1105-2-100 or other appropriate guidance.

d. MSC and district quality manuals will prescribe specific procedures for the conduct of DQC including documentation requirements and maintenance of associated records for internal audits to check for proper DQC implementation. For each Agency Technical Review (ATR) event, the ATR team will examine, as part of its ATR activities, relevant DQC records and provide written comment in the ATR report as to the apparent adequacy of the DQC effort for the associated product or service.

#### 9. Agency Technical Review.

a. Agency Technical Review (ATR) is undertaken to "ensure the quality and credibility of the government's scientific information" in accordance with this circular, and the QM of the responsible MSC. (This level of review was previously named "Independent Technical Review" and may be described as such in some referenced guidance.) This level of review shall also cover any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products and any in-kind services provided by local sponsors.

b. ATR is mandatory for all decision and implementation documents. For other work products, a case specific risk-informed decision, as described in paragraph 15 below, shall be made as to whether ATR is appropriate. Refer to the Planning SMART Guide for further procedures on reviews of SMART Planning studies (<http://planning.usace.army.mil/toolbox/smart.cfm>).

c. Management of ATR reviews is dependent upon the phase of work, and the reviews are all conducted by professionals outside of the home district. ATR teams will be assigned by the appropriate RMO and comprised of senior USACE personnel, preferably recognized subject matter experts with the appropriate technical expertise such as regional technical specialists (RTS), and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC.

(1) Decision Documents. For ATR on decision documents, the RMO generally will be the appropriate Planning Center of Expertise (PCX), e.g. for flood risk management (FRM) decision documents, the FRM PCX would manage the effort. For dam or levee safety modification studies, the USACE Risk Management Center (RMC) will be the RMO, in close coordination with the FRM PCX or the Coastal Storm Damage Reduction PCX, as appropriate. See Appendix G for special provisions associated with the Continuing Authorities Program (CAP).

(a) ATR will be conducted by a qualified team from outside of the home district that is not involved in the day-to-day production of the project/product.

(b) For decision documents with multiple purposes (or project purposes not clearly aligned with the PCXs), the home MSC should designate a lead PCX to conduct the review after coordinating with each of the relevant Centers.

(c) There shall be appropriate consultation throughout the review with the allied Communities of Practice (CoPs) such as engineering and real estate, other relevant CXs, and other relevant offices to ensure that a review team with appropriate expertise is assembled and a cohesive and comprehensive review is accomplished.

(d) There shall be coordination with the Cost Engineering Mandatory Center of Expertise (MCX) located in the Walla Walla District, which will provide the cost engineering review and resulting certification.

(2) Other Work Products. For other work products, the ATR shall be managed and performed outside of the home district. The USACE Risk Management Center (RMC) shall serve as the RMO for Dam Safety Modifications projects and Levee Safety Modification projects. For all other projects, the MSC shall serve as the RMO. There shall be appropriate coordination and processing through CoPs, relevant PCXs, and other relevant offices to ensure that a review team with appropriate independence and expertise is assembled and a cohesive and comprehensive review is accomplished.

d. ATR efforts will include the necessary expertise to address compliance with applicable published policy. When policy and/or legal concerns arise during ATR efforts that are not readily and mutually resolved by the PDT and the reviewers, the district will seek issue resolution support from the MSC and HQUSACE in accordance with the procedures outlined in ER 1105-2-100 (Appendix H), or other appropriate guidance.

e. Additional discussion on ATR is in Appendix C and the Planning SMART Guide.

#### 10. Independent External Peer Review.

a. Independent External Peer Review (IEPR) is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. Any work product, report, evaluation, or assessment that undergoes DQC and ATR also **MAY** be required to undergo IEPR under certain circumstances. A risk-informed decision, as described in paragraph 15 below, will be made as to whether IEPR is appropriate for that product.

b. Review Teams and Panels. IEPR panels will be made up of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. Panel members will be selected using the National Academies of Science (NAS) policy for selecting reviewers.

c. IEPR teams are not expected to be knowledgeable of Army and administration policies, nor are they expected to address such concerns. However, an IEPR team should be given the flexibility to bring important issues to the attention of decision makers.

d. The Water Resources Development Act of 2007 included two separate requirements for review by external experts. The first, Section 2034, required independent peer review of

project studies under certain conditions. The second, Section 2035, required a Safety Assurance Review (SAR) of “the design and construction activities for hurricane and storm damage reduction and flood damage reduction projects.” USACE policy extends this to all projects with life safety issues. These statutory requirements, as well as the USACE existing requirements for review of work products are the basis for this circular. Sections 2034 and 2035, besides having different foci, also differ significantly in legislative language. This necessitates some variation in the scope and procedures for IEPR, depending on the phase and purposes of the project under review. For clarity, IEPR is divided into two types, Type I is generally for decision documents and Type II is generally for implementation documents. The differing criteria for conducting the two types of IEPR can result in work products being required to have Type I IEPR only, Type II IEPR only, both Type I and Type II IEPR, or no IEPR.

#### 11. Type I IEPR.

a. Type I IEPR is conducted on project studies. It is of critical importance for those decision documents and supporting work products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental and social effects to the nation. However, it is not limited to only those cases and most studies should undergo Type I IEPR.

b. The requirement for Type I IEPR is based upon Section 2034 of WRDA 2007, the OMB Peer Review Bulletin and other USACE policy considerations.

c. Type I IEPR reviews are managed outside the USACE, panel members will be selected by an Outside Eligible Organization (OEO - see Glossary) using the National Academies of Science (NAS) policy for selecting reviewers. Although the NAS is frequently cited for the type of IEPR process the USACE should follow, actual reviews by the NAS are expected to be rare. Decisions to approach NAS must be made by the Director of Civil Works (DCW) based on the recommendation of the appropriate Regional Integration Team (RIT) at HQUSACE in coordination with appropriate Community of Practice (CoP), generally the Planning and Policy CoP. The panels will conduct reviews that cover the entire project concurrent with the product development.

d. In keeping with the principle that IEPR should be scalable to the work product being reviewed, there may be cases that warrant a project study or decision document, which would otherwise be required to undergo a Type I IEPR, being excluded from the Type I process. For IEPR on decision documents, the RMO will be the appropriate PCX or, in the case of dam or levee safety modification reports, the USACE RMC in close coordination with the appropriate PCX. The vertical team (involving district, MSC, PCX, RMC, and HQ members) will advise the MSC Commander as to whether Type I IEPR is appropriate or whether sufficient rationale exists to support a request for an exclusion. Requests seeking an exclusion from Type I IEPR shall comply with Paragraph 15, Risk-Informed Decisions on Appropriate Reviews, below. The conditions determining whether Type I IEPR will be undertaken are as follows:

(1) Type I IEPR is mandatory if any of the following are true:

(a) Significant threat to human life. The decision document phase is the initial concept design phase of a project. Therefore, when life safety issues exist, a Type I IEPR that includes a Safety Assurance Review is required;

(b) Where the estimated total cost of the project, including mitigation costs, is greater than \$45 million based on a reasonable estimate at the end of the reconnaissance phase. If a project has a cost estimate of less than \$45 million at the end of the reconnaissance phase, but the estimated costs subsequently increase to more than \$45 million, a determination will be made by HQUSACE whether a Type I IEPR is required. There is a potential, albeit an extremely limited one, for projects costing over \$45 Million to be excluded from Type I IEPR. This potential only exists when no other mandatory conditions listed in this section are met, the project does not include an EIS, the various aspects of the problems or opportunities being addressed are not complex, and there is no controversy surrounding the study. An exclusion from Type I IEPR for a project costing more than \$45 Million can only be granted by the Chief of Engineers;

(c) Where the Governor of an affected State requests a peer review by independent experts; or

(d) Where the DCW or the Chief of Engineers determines that the project study is controversial due to significant public dispute over either the size, nature, or effects of the project or the economic or environmental costs or benefits of the project.

(2) Type I IEPR is discretionary where the head of a Federal or state agency charged with reviewing the project study determines that the project is not likely to have a significant adverse impact on environmental, cultural, or other resources under the jurisdiction of the agency after implementation of proposed mitigation plans and he/she requests an IEPR.

(a) A decision whether to conduct IEPR must be made within 21 days of the date of receipt of the request by the head of the Federal or State agency.

(b) If the Chief of Engineers decides not to conduct an IEPR following such a request the Chief shall make publicly available the reasons for not conducting the IEPR.

(c) If the Chief of Engineers decides not to conduct an IEPR following such a request, it may be appealed to the Chairman of the Council on Environmental Quality within 30-days of the Chief's decision and the Chairman shall decide the appeal within 30 days of the date of the appeal.

(3) Section 2034 permits project studies to be excluded from independent peer review under certain circumstances. However, the Conference Report for WRDA 2007 describes a "very limited number of project studies" being excluded from independent peer review, which are "so limited in scope or impact that they would not significantly benefit from an independent peer review." In most cases, requests for exclusions will be decided by the

DCW. As noted in Paragraph 11.d.(2)(b), requests for exclusions for projects costing over \$45 million will be routed through the Deputy Commanding General for Civil and Emergency Operations with the decision made by the Chief of Engineers. A project study may be excluded from Type I IEPR in cases where none of the above mandatory triggers (with the limited exception noted in Paragraph 11.d.(2)(b)) are met and:

(a) It does not include an EIS, and the DCW or the Chief determines that the project:

- Is not controversial; and
- Has no more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources;
- Has no substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures; and
- Has, before implementation of mitigation measures, no more than a negligible adverse impact on a species listed as endangered or threatened species under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.) or the critical habitat of such species designated under such Act;

OR

(b) If the project study

- Involves only the rehabilitation or replacement of existing hydropower turbines, lock structures, or flood control gates within the same footprint and for the same purpose as an existing water resources project; or
- Is for an activity for which there is ample experience within the USACE and industry to treat the activity as being routine; AND
- Has minimal life safety risk;

OR

(c) If the project study does not include an EIS and is a project study pursued under the CAP Program.

e. Type I IEPRs are exempted by law from the Federal Advisory Committee Act (FACA). Additional discussion on Type I IEPR is in Appendix D.

## 12. Type II IEPR (SAR).

a. A Type II IEPR (SAR) shall be conducted on design and construction activities for any project where potential hazards pose a significant threat to human life (public safety).

This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities.

b. The requirement for Type II IEPR is based upon Section 2035 of WRDA 2007, the OMB Peer Review Bulletin and other USACE policy considerations.

c. External panels will conduct reviews of the design and construction activities prior to the initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health, safety, and welfare. See Appendix E for further discussion of panels.

d. The Review Management Office for Type II IEPR reviews is the USACE Risk Management Center (RMC). Panel members will be selected using the National Academies of Science (NAS) policy for selecting reviewers. See Appendix E for further discussion of panels.

e. Type II IEPRs are not exempted by statute from the Federal Advisory Committee Act (FACA). Type II IEPR procedures to follow are in Appendix E.

### 13. Special Cases IEPR.

a. Special cases exist where non-Federal interests undertake the study, design or implementation of a Federal project or a modification to a USACE project. Authorities for such actions include, but are not limited to, 33 USC 408, Sections 203 and 204 of WRDA 1986, Section 206 of WRDA 1992, and Section 211 of WRDA 1996.

b. When a non-Federal interest undertakes a study, design, or implementation of a Federal project, or requests permission to alter a Federal project, the non-Federal interest is required to undertake, at its own expense, any IEPR that the Government determines would have been required if the Government were doing the work. The non-Federal interest shall make a risk informed decision, as described in paragraph 15 below, on whether to undertake a Type I and/or Type II IEPR and document their proposed reviews in a Review Plan that will be reviewed by the local district and approved by the host MSC Commander. The Federal Advisory Committee Act does not apply to peer reviews undertaken by non-Federal interests. The non-Federal interest is required to use the National Academies of Science (NAS) policy for selecting reviewers and is encouraged to use an OEO for management of the effort.

c. Any IEPR undertaken by a non-Federal Interest shall be submitted as part of the decision package for review by USACE and ultimate action by USACE or Army. See Appendix G for review requirements other than IEPR for non-federal special cases.

14. Policy and Legal Compliance Reviews. All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews

culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority. The technical review efforts addressed in this Circular, i.e. DQC and ATR, are to augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

15. Risk Informed Decisions on Appropriate Reviews.

a. Appropriate Reviews. All work products must undergo DQC. Beyond DQC, however, there is some level of judgment involved in determining whether ATR and/or IEPR levels of review are appropriate for any work product. Therefore, the RP for all work products shall include documentation of risk-informed decisions on those levels of review. Additional details on the various levels of review are provided below.

b. ATR. All decision and implementation documents are required to undergo ATR, regardless of the originating organization (Planning, Engineering, Construction, or Operations). In deciding whether to undertake ATR for other work products, answering a series of questions will aid the PDT to help identify work products as decision or implementation documents, even if they are not identified as such. Also, this process provides a basis for making a recommendation whether undertaking ATR is appropriate for products that are not either a decision or implementation document. A “yes” answer does not necessarily indicate ATR is required, rather it indicates an area where reasoned thought and judgment should be applied and documented in the recommendation. The following questions, and any appropriate additional questions, shall be explicitly considered:

- (1) Does it include any design (structural, mechanical, hydraulic, etc)?
- (2) Does it evaluate alternatives?
- (3) Does it include a recommendation?
- (4) Does it have a formal cost estimate?
- (5) Does it have or will it require a NEPA document?
- (6) Does it impact a structure or feature of a structure whose performance involves potential life safety risks?
- (7) What are the consequences of non-performance?
- (8) Does it support a significant investment of public monies?
- (9) Does it support a budget request?
- (10) Does it change the operation of the project?

(11) Does it involve excavation, subsurface investigations (drilling or sampling or both), or placement of soil?

(12) Does it affect any special features, such as cultural resources, historic properties, survey markers, etc, that should be protected or avoided?

(13) Does it involve activities that trigger regulatory permitting such as Section 404 or stormwater/NPDES related actions?

(14) Does it involve activities that could potentially generate hazardous wastes and/or disposal of materials such as lead based paints or asbestos?

(15) Does it reference use of or reliance on manufacturers' engineers and specifications for items such as prefabricated buildings, playground equipment, etc?

(16) Does it reference reliance on local authorities for inspection/certification of utility systems like wastewater, stormwater, electrical, etc?

(17) Is there or is there expected to be any controversy surrounding the Federal action associated with the work product?

c. IEPR. Any work product that undergoes ATR may also be required to undergo Type I and/or Type II IEPR. Meeting the specific conditions identified for **possible** exclusions is not, in and of itself, sufficient grounds for recommending an exclusion. A deliberate, risk-informed recommendation whether to undertake IEPR shall be made and documented by the PDT, as discussed below. The recommendation will be submitted to the MSC. The MSC Commander has approval authority to undertake IEPR. However, if the MSC concurs with a recommendation to exclude the project from IEPR, the MSC will forward the recommendation with its endorsement to the appropriate RIT for coordination in HQ and appropriate action. Once the DCW's or the Chief's decision is rendered, the recommendation and decision will be documented in the review plan.

d. Type I IEPR. Type I IEPR is mandatory under the circumstances described in Paragraph 11.d.1. and in Appendix D. When a decision document does not trigger a mandatory Type I IEPR (as discussed in Paragraph 11.d.1), a risk-informed recommendation will be developed. This process shall explicitly consider the consequences of non-performance on project economics, the environment, and social well-being (public safety and social justice), as well as indicate whether the product is likely to contain influential scientific information or be a highly influential scientific assessment; or involve any other issues that provide a rationale for determining the appropriate level of review. Furthermore, the recommendation must make a case that the study is so limited in scope or impact that it would not significantly benefit from IEPR.

e. Type II IEPR. A Type II IEPR is required to insure public health, safety, and welfare. The circumstances requiring a Type II IEPR are described in Appendix E. Each of those

circumstances must be explicitly considered in developing a risk-informed rationale for determining the appropriate level of review, including the need for a safety assurance review.

## 16. Administration.

a. Federal Advisory Committee Act (FACA). FACA imposes requirements on groups established by statute, or established or utilized by the President or an agency that provide advice or recommendations to the President or an agency pertaining to Executive policy. Under WRDA 2007 Section 2034, FACA does not apply to Type I IEPR panels established in accordance with this circular. Section 2035 of WRDA 2007 does not specifically exempt panels for Type II IEPR from FACA.

b. If the PDT is uncertain whether FACA applies to a particular review, it should consider the following characteristics of groups that must comply with FACA:

(1) The group includes a member that is not a Federal employee, or State, local or Tribal government employee;

(2) The group is established, controlled, and/or managed by the USACE;

(3) The group has a fixed membership, established purpose, and an agenda set by the USACE;

(4) The group strives to produce group, rather than individual, advice to the USACE.

c. Peer reviews performed solely by Federal employees or State, local and Tribal government employees do not trigger FACA, although to ensure independence USACE employees should not be involved in performing the review. Questions regarding the applicability of FACA to external peer review should be addressed to the district Office of Counsel.

d. Judicial Review. This Circular is intended to improve the internal management of the USACE Civil Works Program, and is not intended to, and does not create any right or benefit, substantive or procedural, enforceable at law or in equity, against the United States, its agencies or other entities, its officers or employees, or any other person.

e. This Circular also does not apply to information that is:

(1) Related to certain national security, foreign affairs, or negotiations involving international trade or treaties where compliance with this Circular would interfere with the need for secrecy or promptness.

(2) Disseminated in the course of an individual agency adjudication or permit proceeding (including a registration, approval, licensing, site-specific determination), unless USACE determines that review is practical and appropriate and that the influential dissemination is

scientifically or technically novel or likely to have precedent setting influence on future adjudications and/or permit proceedings.

(3) A health or safety dissemination where USACE determines that the dissemination is time-sensitive.

(4) A USACE regulatory impact analysis or regulatory flexibility analysis subject to interagency review under Executive Order 12866, except for underlying data and analytical models used.

(5) Routine statistical information released by Federal statistical agencies (e.g., periodic demographic and economic statistics) and analyses of these data to compute standard indicators and trends (e.g., unemployment and poverty rates).

(6) Accounting, budget, actuarial, and financial information, including that which is generated or used by agencies that focus on interest rates, banking, currency, securities, commodities, futures, or taxes.

(7) Information disseminated in connection with routine rules that materially alter entitlements, grants, user fees, or loan programs, or the rights and obligations of recipients thereof.

(8) Responses to letters of inquiry, responses to Freedom of Information Act (FOIA) requests, and internal disseminations.

## 17. Implementation.

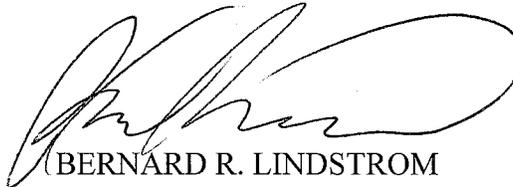
a. Decision Documents. This guidance is effective immediately and shall be applied to all studies and reports regardless of the date the FCSEA was signed, except for only those cases where the submittal of the final decision document package had been forwarded to HQUSACE prior to 22 August 2008. The costs associated with DQC and ATR will be shared in accordance with the project purpose(s) and the phase of work. The costs associated with Type I IEPR, excluding the costs of contracts for panels, are also cost shared. The costs of contracts for Type I IEPR panels executed after the enactment of WRDA 2007, 8 November 2007, will be a Federal expense and will not exceed \$500,000 unless the Chief of Engineers determines that a higher cost may be appropriate in a specific case. Any contracts for Type I IEPR panels that were executed prior to 8 November 2007 and whose costs were shared in accordance with Sec 105 (a) of WRDA 1986 will remain cost shared. For studies conducted by non-Federal interests Type I IEPR costs will initially be borne by the non-Federal sponsor and, if the project is implemented at some later date, these costs may be eligible for credit, subject to the cost limits above.

b. Implementation Documents. This guidance is effective immediately for any projects subject to Type II IEPR in Pre-Construction Engineering and Design (PED) or under construction as of 8 November 2007. All costs associated with Type II IEPR, will be shared in accordance with the project purpose(s) and the phase of work. In planning for a Type II

review, estimates will need to include the cost for the RMO to administer and manage the Type II review and the cost of the independent panel. The cost of a Type II review through completion of construction should be reasonable, scalable and a function of the complexity and duration of the project.

c. Guidance for Additional Funding. Normal budgetary procedures will be used to seek funds where IEPR funds have not been appropriated. The costs for any anticipated IEPR will be requested by study (or project) as part of the normal budget development process.

FOR THE COMMANDER:



BERNARD R. LINDSTROM  
Colonel, Corps of Engineers  
Executive Director of Civil Works

7 Appendices

Appendix A – References

Appendix B – Review Plans

Appendix C – DQC and ATR

Appendix D – Type I IEPR – Independent Peer Review

Appendix E – Type II IEPR - Safety Assurance Review

Appendix F – Roles and Responsibilities

Appendix G – Special Cases and Provisions

Glossary



## APPENDIX A

### References

Treasury and General Government Appropriations Act of 2001, Section 515, Pub. L. 106-554 (often called The Information Quality Act).

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Executive Order 12866 (Regulatory Planning and Review)

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## APPENDIX B

### Review Plans

1. Applicability. In general, all projects or activities will be covered by a Review Plan (RP). The RP is the basis for our addressing the Information Quality Act requirement to ensure and maximize the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency. For large projects, whether in planning, design, construction, or an operating project, a single RP covering all the various work associated with the project should be developed. However, when an activity generally covered under such an overarching RP involves complexities, controversy, or other attributes that would require review beyond that envisioned in the overall RP, a separate review plan is required for that activity. For example, at an operational Corps Lake, most routine activities would be covered under the overarching RP while others such as major rehabilitation studies, dam safety modification reports, activities requiring a separate EIS, etc. would require individual RP's. Similarly, to ensure nationwide consistency, the MSC's, together with the appropriate PCX, shall develop a single national RP for each Continuing Authority program that includes the anticipated review process for that authority. The national CAP RP's must also clearly describe the circumstances when an individual RP must be developed for a specific CAP, e.g. when the study requires an EIS or involves life safety issues. The PCX shall recommend, if appropriate, a single nationwide exclusion for projects covered by the review plan.

Programmatic review plans may also be appropriate in other instances, such as regional environmental infrastructure authorities. Such review plans would also be developed by the appropriate PCX. Prior to initiating RP development, the PCX should coordinate with HQUSACE for guidance on whether a programmatic review plan is appropriate. Approval of all programmatic Review Plans rests with the Director of Civil Works (DCW).

2. Responsibilities. The development of the RP is generally the responsibility of the Project Delivery Team (PDT), in concert with the Review Management Organization (RMO). The PDT is responsible for recommending the necessary type(s) of reviews as well as the particular disciplines/expertise required. The Review Plan will be published on the district's public internet site following endorsement by the RMO and signature approval by the MSC Commander.

3. Development of Review Plans.

a. In developing RPs, the home district shall provide an opportunity for public comments and for considering those comments in the decision of the type of review to be carried out. Review Plans must be detailed enough to assess the necessary level and focus of review – which parts of the study will likely be challenging, which models and data are proposed, model certification needs, etc. RPs must anticipate and define the appropriate level of review from the very start of the effort based upon a preliminary assessment of where project risks are most likely to occur and the magnitude of what this risk might be.

b. The RP shall be prepared within the district or other USACE office responsible for the project, in coordination with the appropriate RMO, and approved by the MSC

Commander. For prospective projects, an initial RP will be developed prior to completing a feasibility cost sharing agreement and revised prior to the completion of each phase to detail the reviews in subsequent phases. The RP must be updated and approved by the MSC throughout the PED and Construction Phases.

c. The RP is a living document and must be kept up-to-date, in coordination with the MSC, to reflect the proper scale and scope of the anticipated reviews. RP updates will be performed to reflect minor changes. Re-approval of RPs should be performed when there are changes in the level of review (i.e. for Type I or Type II IEPR). Other situations requiring MSC re-approval should be very limited, including when a project transitions from legacy to SMART Planning milestones/peer review requirements or when there are significant changes in study/project scope (e.g., adding subtracting a purpose, etc).

#### 4. Content of Review Plans.

a. A paragraph including the project title, subject and purpose of the work product, discipline/area of expertise of reviewers and designated points of contact in the home district, MSC and RMO to whom inquiries about the plan may be directed.

b. Documentation of risk-informed decisions on which levels of review are appropriate for the product. This documentation is to include the District Chief of Engineering's assessment as to whether there is a significant threat to human life associated with the project.

c. The timing and sequence of the reviews (including deferrals). Refer to the Planning SMART Guide (<http://planning.usace.army.mil/toolbox/smart.cfm>) for further procedures on timing and sequence of reviews of SMART Planning studies.

d. How and when there will be opportunities for the public to comment on the study or project to be reviewed.

e. When significant and relevant public comments will be provided to the reviewers before they conduct their review.

f. The anticipated number of reviewers.

g. A succinct description of the primary disciplines or expertise needed in the review.

h. Whether the public, including scientific or professional societies, will be asked to nominate potential reviewers.

i. A list of the models expected to be used in developing recommendations, and the model certification/acceptance status of those models.

j. A list of expected in-kind contributions to be provided by the sponsor.

k. The Review Plan shall also contain an execution plan that explains how all the reviews will be accomplished and documented. The following are factors that must be considered in developing the Review Plan and selecting reviewers:

(1) Reviewers' Expertise and Balance. Subject matter experts from within USACE or outside USACE may conduct ATR. ATR reviewers shall be selected by the RMO and IEPR reviewers by the RMO, contractor, or OEO, as appropriate. Selections will be based on expertise, experience, and skills, including specialists from multiple disciplines as necessary to ensure comprehensive review. The group of qualified reviewers shall be formed into panels that are sufficiently broad and diverse to fairly represent the relevant scientific and engineering perspectives and fields of knowledge.

(2) Reviewers' Conflicts. RMO shall ensure that reviewers serving as Federal employees (including special government employees) comply with applicable Federal ethics requirements. In selecting reviewers who are not Federal government employees, the National Academy of Sciences' policy for committee selection with respect to evaluating the potential for conflicts (e.g., those arising from investments; agency, employer, and business affiliations; grants, contracts and consulting income) shall be adopted or adapted.

(3) Reviewers' Independence. IEPR must be performed by subject matter experts from outside of USACE. Peer reviewers shall not have participated in development of the report, appendix, or other work product to be reviewed. RMOs are encouraged to rotate membership on standing panels across the pool of qualified reviewers. OEOs shall bar participation of scientists employed by USACE.

(4) Reviewers' Privacy. Peer reviewers will be advised whether information about them (name, credentials, and affiliation) will be disclosed. The RMO shall comply with the requirements of the Privacy Act. Also see paragraph 13 (b).

(5) Reviewers' Compensation. External Reviewers will be paid labor and any necessary travel and per diem expenses in accordance with their contract with the RMO, NAS, or OEO.

(6) Reviewers' Charge. The RMO will prepare the charge to the reviewers, containing the instructions regarding the objective of the peer review and the specific advice sought. Reviewers shall be charged with reviewing scientific and technical matters, leaving policy determinations for USACE and the Army. The charge should specify the structure of the review comments to fully communicate the reviewer's intent by including: the comment, why it is important, any potential consequences of failure to address, and suggestions on how to address the comment. It should include specific technical questions while also directing reviewers to offer a broad evaluation of the overall document. The charge should be determined in advance of the selection of the reviewers.

(7) Confidentiality. Review shall be conducted in a manner that respects confidential business information and intellectual property.

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(8) Choice of Review Mechanism. The choice of a review mechanism (including the make-up of the review panel and the number of external reviewers) shall be based on the novelty and complexity of the information to be reviewed, the importance of the information to decision making, the extent of prior review, and the expected benefits and costs of review, as well as the factors regarding transparency described below. For decision documents undergoing Type I IEPR, the RMO must commission eligible entities to manage the review process, including the selection of reviewers, in accordance with this Circular.

(9) Reviewers' Access to Information. The RMO shall provide reviewers with sufficient information, including background information about key studies or models, to enable them to understand the data, analytic procedures, and assumptions used to support the key findings or conclusions. Reviewers shall be informed of applicable access, objectivity, reproducibility and other quality standards under the federal laws governing information access and quality.

(10) Disclaimer. Information distributed for review must include the following disclaimer: "This information is distributed solely for the purpose of pre-dissemination review under applicable information quality guidelines. It has not been formally disseminated by USACE. It does not represent and should not be construed to represent any agency determination or policy."

(11) Opportunity for Public Participation. Whenever feasible and appropriate, the office producing the document shall make the draft decision document available to the public for comment at the same time it is submitted for review (or during the review process) and sponsor a public meeting where oral presentations on scientific issues can be made to the reviewers by interested members of the public. When employing a public comment process, the RMO shall, whenever practical, provide reviewers with access to public comments that address significant scientific or technical issues. To ensure that public participation does not unduly delay USACE activities, the RMO shall clearly specify time limits for public participation throughout the review process.

(12) Transparency.

(a) The RMO shall notify reviewers in advance regarding the extent of disclosure and attribution planned by USACE.

(b) The RMO, ATR leader, or OEO shall prepare a Review Report that shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer.

- Include the charge to the reviewers.

- Describe the nature of their review and their findings and conclusions.

- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

(13) Documentation of Responses. The RP will also document how written responses to the Review Report will be prepared to explain the agreement or disagreement with the views expressed in the report, the actions undertaken or to be undertaken in response to the report, and the reasons those actions are believed to satisfy the key concerns stated in the report (if applicable). The plan will detail how the RMO shall disseminate the final Review Report, USACE response, and all other materials related to the review, and include them in the applicable decision document. The final decision document for project studies that undergo IEPR shall summarize the Review Report and USACE responses.

#### 5. Approval of the Review Plan.

a. The MSC that oversees the home district is responsible for approving the RP. An MSC approval letter (Figure 1) is required for each review plan and must be included in the posted version of the RP. The approval of each RP shall be signed by the MSC Commander; delegation of signature authority for Review Plans is not allowed. If there is disagreement over the scope, content or other aspects of the Review Plan, the MSC should coordinate resolution between the district and the RMO. The commander's approval should reflect vertical team input (involving district, MSC, RMO and Headquarters members) whether the covered subject matter (including data, use of models, assumptions, and other scientific and engineering information) has public safety concerns, is novel, is controversial, is precedent setting, has significant interagency interest, or has significant economic, environmental and social effects to the nation or where specific requests for IEPR are likely. For decision documents, if the RP does not include IEPR, the MSC must obtain an exclusion from IEPR from the Director of Civil Works (DCW) or the Chief of Engineers, prior to approval of the RP.

FIGURE 1

*Date:*

*Subject: Review Plan approval for (work product name here)*

*The attached Review Plan for the (work product name here) has been prepared in accordance with EC 1165-2-214.*

*The Review Plan has been coordinated with the (RMO name here) of the (MSC) which is the lead office to execute this plan. For further information, contact the RMO at xxx-xxx-xxxx. The Review Plan (includes / does not include) independent external peer review.*

*I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.*

*MSC Commander Signature Block*

b. Upon MSC approval of each RP, the MSC will provide a copy of the signed MSC Approval Memo to its respective HQUSACE Regional Integration Team (RIT). An approved RP does not supersede or waive regulatory requirements.

c. Like any aspect of a PMP, the RP is a living document and may change as the study/project progresses. In particular, review plans for studies shall be updated at least three times; when the without-project conditions are identified; when the array of alternatives to be considered are identified; and when the preferred alternative is identified. These updates are especially important in those rare cases where an exclusion from IEPR has been granted. As part of the update, the specific conditions and circumstances that supported the exclusion must be reassessed. The PDT, RMO and the vertical team shall jointly recommend whether or not the exclusion should be withdrawn and IEPR be undertaken. For studies where IEPR has been planned but not yet initiated, the RP updates will include an assessment of whether IEPR initiation should occur earlier than previously planned. Re-approval of an RP due to significant changes in the study/scope or level of review should be approved by following the process used for initially approving an RP. In all cases the MSCs will review the decision on the level of review, and any changes made to the RP.

d. Prior to completion of all decision documents, the home district shall prepare an updated Review Plan for the next phase. When a decision document goes before the DCG-CEO, the updated RP detailing the reviews for the Preconstruction Engineering and Design (PED) and Construction Phases will be presented by the MSC Commander.

e. For those projects that do not come to HQ, the District and MSC should ensure that , at a minimum, the next phase of work is covered by an up-to-date Review Plan that outlines the upcoming reviews and milestones. If the next phase of the project has never been covered in

a previously approved RP (RMO endorsement and MSC Commander signature), that formal approval process is required.

6. Posting Review Plans.

a. District. Each district will maintain a web site that hosts electronic versions of review plans for its studies/projects with their MSC approval letters as well as a list of the current and active Review Plans with links to the documents. In posted documents, lists of the names of USACE reviewers should not be displayed. PCX, MSC and HQ postings will link to the district's site. Each district shall establish a mechanism on their web site for allowing the public to comment on the adequacy of the Review Plans, and shall consider public comments on Review Plans.

b. MSC. Each MSC shall post on its website, and update at least every three months, an agenda (list) of Review Plans. The agenda shall describe all decision documents covered by this Circular, describe the Review Plan for each entry on the agenda, and provide a link from the agenda to each document that has been made public pursuant to this Circular. MSCs are encouraged to offer electronic notification mechanisms to alert interested members of the public when entries are added or updated.

c. Each PCX shall post on its website, and update monthly, a listing of all review plans for studies/projects that include relevant project purposes, including links to the documents.

d. CECW-CP will establish and maintain a web site that provides links to the appropriate MSC and PCX sites.



## APPENDIX C

## District Quality Control and Agency Technical Review

1. All Civil Works work products will undergo necessary and appropriate DQC and ATR to ensure the quality and credibility of the government's scientific and budgetary information in accordance with this circular and the quality management procedures of the responsible command. The level of review should be commensurate with the significance of the information being reviewed. ATR shall not serve as a substitute for DQC.

2. DQC shall be implemented and documented in accordance with procedures prescribed in MSC and district quality manuals and Paragraph 8 of the main body of this circular. Attachment C-1 provides a sample statement of technical review and completion of quality assurance review and agency technical review.

3. ATR, previously known as ITR (and referred to in this way in some referenced publications) shall be conducted in accordance with Paragraph 9 of this circular and the following additional information:

a. Purpose. The purpose of agency reviews throughout the project life cycle, including ATR, policy compliance and legal reviews, generally is to ensure that the appropriate problems and opportunities are addressed; confirm that appropriate solutions are considered; confirm that the appropriate solution is recommended; assure that accurate cost, scheduling and associated risks are presented; confirm that the recommended solution warrants USACE participation; is in accord with current policies; can be implemented in accordance with environmental laws and statutes; and has a sponsor willing and able to fulfill the non-Federal responsibilities; and ensure that the decision document appropriately represents the views of the Corps of Engineers, the Army, and the President.

b. Definition of Success. The corporate intent is for an ATR to not only ensure technical analyses are correct, but to also ensure compliance with all pertinent USACE guidance in order to achieve adequate quality early in studies and help shift HQUSACE policy compliance review to a more confirmatory role and a less confrontational, less corrective role. The scope, extent and type of subsequent HQUSACE policy compliance review comments may be considered a measure of the effectiveness of the PDT and ATR efforts.

c. Supporting Principles.

(1) Each Commander is responsible for assuring that the work product complies with all applicable statutory and policy requirements and, most importantly, has been read for consistency as well, prior to forwarding to higher authority.

(2) The PDT is responsible for project success and for delivering a quality product in accordance with ER 5-1-11. The PDT is responsible for developing work products in accordance with the procedures and policies set forth in USACE engineering regulations and circulars.

(3) The PDT, supported by the appropriate Communities of Practice, is knowledgeable of USACE water resources policies and procedures, and has the expertise to support the project development process.

(4) Home district Office of Counsel is responsible for the legal review of each decision document and signing a certification of legal sufficiency.

(5) MSC Commanders are responsible for ensuring policy and legal compliance, and documenting technical, policy and legal compliance for decision documents that have been delegated to MSCs for review and approval in accordance with ER 1165-2-502.

(6) For decision documents that are required to be presented to the DCG-CEO, the District Commander will address the review, including the major concerns expressed and how those concerns were resolved. The MSC Commander will present the certifications of technical, legal and policy compliance, and any MSC quality assurance observations. The MSC Commander will summarize the field QA/QC efforts, specifically the certifications of technical, cost, legal and policy compliance. They will present the review process and results, including the involvement, comments and comment resolution of the Planning Centers of Expertise, Cost Engineering MCX, IEPR team, and any significant and/or unresolved technical, legal or policy compliance concerns. The leader of the ATR team will participate to address review concerns.

(7) HQUSACE is responsible for confirming the technical, cost, policy and legal compliance of planning products; supporting the resolution of issues requiring HQUSACE, ASA (CW) or OMB decisions; continuously evaluating the overall project development process, including the review and policy compliance processes (including responsibilities delegated to MSCs); and recommending appropriate changes when warranted.

#### d. Policy

(1) Objective of ATR. The ATR shall ensure that the product is consistent with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers.

#### (2) Scope of ATR.

(a) The ATR will examine the materials submitted to ensure the adequacy of the presented methods, assumptions, criteria, decision factors, applications, and explanations.

(b) Policy compliance is explicitly within the scope of ATR. The corporate intent is for ATR to identify and, through participation of the vertical team, resolve common policy concerns early and prior to HQUSACE policy compliance reviews. The scope, extent and type of subsequent HQUSACE policy compliance review comments may be considered a measure of the efficacy of the study and ATR efforts.

e. Planning for ATR.

(1) The ATR tasks and related resource, funding and schedule needs will be addressed in the Review Plan before the FCSA or Design Agreement is executed. The ATR efforts should be integrated into the product development schedule to avoid and minimize impacts on the schedule as much as possible; and to avoid rework and delays that would likely occur if reviews are deferred to the end of the study. Once a review is opened for comment (be it for one or more product components), a reasonable time should be established for both issue identification and issue resolution. Reviews shall not be left open for indefinite periods and all comments should be backchecked prior to closing a review. Unresolved comments involving disagreement between the ATR team and the PDT shall be closed with the notation that the comment has been elevated for resolution. Any such issues shall be explicitly listed on the ATR certification form prior to signature.

(2) The PDT will coordinate the RP with the appropriate RMO to ensure that ATR activities are reasonably represented in the PMP, particularly the schedule and resource needs.

f. ATR Team.

(1) The ATR team shall be established shortly after the PDT is established, and in the case of feasibility studies, after the FCSA is executed.

(2) The disciplines represented on the ATR team should mirror the significant disciplines involved in the accomplishment of the work.

(3) For decision documents involving hydrologic, hydraulic, and/or coastal related risk reduction measures, the ATR team will include a subject matter expert in multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis and written communication of risk and uncertainty.

g. ATR Timing.

(1) Each application of ATR should build upon any and all prior cycles of review for any product. Each ATR review iteration needs to only address incremental changes and additions to documents and analyses addressed in prior ATR reviews, unless the ATR team determines that certain subjects or aspects warrant revisiting due to other changes or a need to adequately understand a larger portion of the product or project. The risk informed decision process outlined in this EC should help guide whether ATR should also be applied at different times in the project development process.

(2) The scheduling of ATR should be presented as part of the Review Plan. ATR will normally occur during key stages in the development of the particular work product and be discussed at milestone meetings, briefings, and IPRs.

(3) Decision documents must adhere to review requirements in ER 1105-2-100, Appendix H Amendment #1. For decision documents prepared under SMART Planning, review requirements will follow the milestones identified in SMART Planning Guide and shall be documented in the Review plan. See Appendix G.

(a) The draft report and supporting analyses warrant ATR because they provide the basis for HQUSACE to determine whether vertical team agreement with the future without project condition and support for the tentatively selected plan is warranted.

(b) The draft report and supporting materials merit ATR because they will be released to the public for review and determine the public, stakeholder, state, other agency and other interest group positions on the tentatively selected plan.

(c) The final report and supporting analyses warrant ATR because they will provide the basis for the Chief of Engineers interagency coordination and the Chief's approval or further recommendation to the Secretary of the Army and the Congress, as needed.

(4) During the design and construction phases, the timing of ATR will be dependent on the complexity of the project and will be explicitly laid out in the review plan, with the concurrence of the vertical team, including the RMO.

(5) All portions of the final work product submittal will have undergone ATR, including any recent revisions that impact cost, schedule or scope.

h. Review Criteria for ATR.

(1) Products will be reviewed against published guidance, including Engineering Regulations, Engineering Circulars, Engineering Manuals, Engineering Technical Letters, Engineering Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda, and other formal guidance memoranda issued by HQUSACE. Any justified and approved waivers should have been obtained from HQUSACE for any deviations from USACE guidance.

(2) Key considerations include:

(a) The project meets the customer's scope, intent and quality objectives as defined in the PMP.

(b) Formulation and evaluation of alternatives are consistent with applicable regulations and guidance.

(c) Concepts and project costs are valid.

(d) The non-Federal sponsor is aware of its requirements and concurs with the proposed recommendations.

(e) The recommended alternative is feasible and will be safe, functional, constructible, environmentally sustainable, within the Federal interest, and economically justified according to policy.

(f) All relevant engineering and scientific disciplines have been effectively integrated.

(g) Appropriate computer models and methods of analysis were used and basic assumptions are valid and used for the intended purpose.

(h) The source, amount, and level of detail of the data used in the analysis are appropriate for the complexity of the project.

(i) The project complies with accepted practice within USACE.

(j) Content is sufficiently complete for the current phase of the project and provides an adequate basis for future development effort.

(k) Project documentation is appropriate and adequate for the project phase.

(3) Additional considerations for Decision Documents.

(a) Recognizing that the quality of each decision document has a direct and immediate impact on the credibility of the Corps of Engineers and the Department of the Army, ATR on decision documents should address the basic communication aspects of the documents. Quality decision documents allow the public and stakeholders to understand the planning effort and its results, and enable decision makers to reach the same conclusions as the reporting officers (i.e., Quality decision documents are not a simple reporting of PDT findings or a record repository of PDT activities).

(b) The main decision document and appendices should form an integrated and consistent product.

(c) As an initial guide, the ATR team should consider the Project Study Issue Checklist in Exhibit H-2, Appendix H, ER 1105-2-100, which includes many of the more frequent and sensitive policy areas encountered in studies.

(d) Other key considerations include:

- Are the existing and future without-project conditions reasonable and appropriate?
- Are the planning objectives, constraints and assumptions consistent with the without-project conditions?
- Do the alternative plans provide a reasonably complete array of solutions, make sense relative to the planning objectives and the without-project conditions, and are they complete, effective, efficient and acceptable?

- Are sufficient alternatives formulated to determine the appropriate combination of measures and a reasonable scale for the selected plan (the National Economic Development (NED), National Ecosystem Restoration (NER) or NED/NER Plan)?

- Are the required plans included, such as nonstructural flood risk management plans?

- Are alternatives safe, functional, constructible, economical, reasonable and sustainable?

- Are calculations and results of analyses essentially correct? There should be documentation in the DQC record on this issue.

- Is the engineering content at a feasibility level-of-detail and is it sufficiently complete to provide an adequate basis for the baseline cost estimate (ER 1110-2-1150)?

- Is the real estate content at a feasibility level-of-detail and is it sufficiently complete to provide an adequate basis for the baseline cost estimate (ER 1110-2-1150)?

- Is the environmental mitigation content at a feasibility level-of-detail and is it sufficiently complete to provide an adequate basis for the baseline cost estimate (ER 1110-2-1150)?

- Are comparable cost estimates used for comparing, screening and selecting alternative plans?

- Are analyses for the engineering, economic, environmental, real estate and other disciplines fully described, technically correct, and do they comply with established policy requirements and accepted practices within USACE?

- Is the appropriate plan selected based on the National Objectives and evaluation criteria expressed in Principles and Guidelines and USACE policy? And

- Does the implementation plan have an appropriate division of responsibilities?

i. ATR Comments.

(1) Each review comment should be succinct and enable timely resolution of the concern. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment normally include:

(a) The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;

(b) The basis for the concern – cite the appropriate law, ASA (CW)/USACE policy, guidance or procedure that has not been properly followed;

(c) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and

(d) The probable specific action needed to resolve the concern – identify the action(s) that must be taken to resolve the concern.

(2) In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist. In such situations, the comments generally would defer identifying a probable solution as indicated under dispute resolution below.

(3) ATR comments should generally not include:

(a) Attempts to enforce personal preferences over otherwise acceptable practices, i.e., alternate solutions or analysis methods when the practitioners have already used appropriate methods to develop an adequate solution;

(b) Any other issues that do not add value towards the planning decisions and recommendations, or do not make the recommended plan safe, functional, or more economical.

j. ATR Process.

(1) The ATR process will be conducted using the DrChecks<sup>sm</sup> review software. The ATR team will provide a written summary of its actions and written specific concerns to the PDT through the RMO.

(2) Upon receipt of the ATR comment memorandum, the PDT will develop responses to the specific concerns and coordinate those responses with the ATR team through the RMO. Technical responses shall be made by product author or by an individual experienced in that discipline area. Responses shall acknowledge and specifically address the comments, indicating resolution steps taken.

(3) Dispute Resolution. The ATR team will complete its review in DrChecks. Thereupon, the PDT will develop and coordinate responses with the ATR team for each comment. The responses and the ensuing discussion are to seek resolution of the ATR concerns to the mutual satisfaction of the PDT and the ATR team. When resolution is not readily achievable, the RMO should engage the PCX or MSC subject matter experts (SMEs) to help facilitate resolution, and they in turn may choose to engage HQUSACE SMEs.

(4) The Agency Technical Review team will identify significant issues that they believe are not satisfactorily resolved and will note these concerns in the Technical Review Certification documentation. The ATR team will prepare a Review Report which includes a

summary of each unresolved issue. Review Reports will be considered an integral part of the ATR documentation.

(5) Significant unresolved ATR concerns that are documented by the RMO will be forwarded through the MSC to the HQUSACE RIT, including basic research of USACE guidance and an expression of desired outcome, for further resolution. HQUSACE may choose to defer the issue to the policy compliance review process or address it directly. At this point the ATR documentation for the concern may be closed with a notation that the concern has been elevated for resolution by HQUSACE. Subsequent submittals of reports for MSC and/or HQUSACE review and approval shall include documentation of the issue resolution process.

(6) The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any ensuing discussion, including any vertical coordination, and lastly the agreed upon resolution.

(7) Statement of Technical Review. The ATR leader must complete a statement of technical review for all final products and final documents. In the case of civil works decision documents forwarded to HQUSACE for review, a statement of technical review will accompany both draft and final documents. The ATR team leader, project manager, RMO, and the chief of the function shall certify that the issues raised by the ATR team have been resolved. By signing the ATR certification, the district leadership certifies policy compliance of the document and also that the District Quality Control (DQC) activities were sufficient and documented. Before the ATR certification is completed, the PDT shall ensure that all agreed upon changes have been incorporated into the final product. For those cases where commitments are made to incorporate changes in the next phase of work (e.g. advancing from Planning into PED), agreed upon deferrals shall be documented in the ATR certification. A sample statement of technical review and certification of ATR is included as Attachment C-1 to this appendix. The statement should always include signatures from the ATR leader, RMO and Project Manager and senior level staff as indicated in the sample. When an A-E performs the ATR, the appropriate principal of the contractor shall sign the statement.

k. Decision Documents - ATR Reporting in Submittals. See Exhibits H-3 through H-7, ER 1105-2-100. For decision documents prepared under SMART Planning, review requirements will follow the milestones identified in SMART Planning Guide and shall be documented in the Review plan. See Appendix G.

(1) For draft report submittals, the district will provide the review certification(s) and the review documentation for the draft decision document, preliminary draft NEPA document, and the supporting analyses. Review will be complete for all supporting technical work products prior to document submission. Any unresolved review issues and the expected path to resolve these issues will be identified. The documentation will address the PCX and Cost Engineering coordination and the application of the Cost Engineering MCX technical review checklist, review comments and certifications and, for the draft reports submission, include the Real Estate Gross Appraisal Review certification.

(2) For final report submittals, the district will provide the documentation and certification of review and, if applicable, IEPR. The documentation will address the PCX and Cost Engineering MCX coordination, review comments and certifications and include the Real Estate Gross Appraisal Review certification.

(3) The project summary accompanying the final report will present the dates of the certifications of the technical and legal adequacy of the final feasibility report, describe the involvement of the PCX, describe the involvement of the Real Estate appraisal reviewer, and summarize the involvement of the Cost Engineering MCX in the approval of the total project cost estimate.

1. Architect-Engineer (AE) or Sponsor Work - All parties that produce deliverables for USACE (studies, designs, etc) are responsible for the quality of those deliverables; their plan to manage quality should be presented in their Quality Control Plan for the product and a District's quality assurance procedures shall insure reasonable adherence to the approved QCP. The formal ATR of the product will be the responsibility of the Review Management Organization (RMO) as defined in Section 7 of this circular. The AE or Sponsor will be accountable for the resolution of any issues identified during the ATR. If IEPR is required, sponsor or AE deliverables will be treated just like any other in-house product except that issue resolution will be a dual responsibility between the product provider and USACE, with USACE having the final authority.

**Attachment C-1**

**COMPLETION OF AGENCY TECHNICAL REVIEW**

The Agency Technical Review (ATR) has been completed for the [product type & short description of item] for [project name and location]. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-214. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer’s needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks<sup>sm</sup>.

*SIGNATURE*

\_\_\_\_\_  
[Name]  
ATR Team Leader  
[Office Symbol or Name of AE Firm]

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
[Name]  
Project Manager (home district)  
[Office Symbol]

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
[Name]  
Architect Engineer Project Manager <sup>1</sup>  
[Company, location]

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
[Name]  
Review Management Office Representative  
[Office Symbol]

\_\_\_\_\_  
Date

**CERTIFICATION OF AGENCY TECHNICAL REVIEW**

Significant concerns and the explanation of the resolution are as follows:  
[Describe the major technical concerns and their resolution and specifically list any agreed-upon deferrals to be completed in the next phase of work.]

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

*SIGNATURE*

\_\_\_\_\_  
[Name]  
Chief, Engineering Division (home district)  
[Office Symbol]

\_\_\_\_\_  
Date

*SIGNATURE*

\_\_\_\_\_  
[Name]  
Chief, Planning Division<sup>2</sup> (home district)  
[Office Symbol]

\_\_\_\_\_  
Date

Add appropriate additional signatures (Operations, Construction, AE principal for ATR solely conducted by AE, etc) and/or modify to accommodate local organizational structure.

1 Only needed if some portion of the ATR was contracted      2Decision Documents Only.

**Attachment C-1 Instructions:** [Input] – Information in Blue brackets and text is required. Once the input is provided, text should be formatted in black and the brackets should be deleted. Delete these instructions in the completed form.

## APPENDIX D

### Type I - IEPR, Independent Peer Review

#### 1. General.

a. Type I IEPR will be performed if there is a vertical team decision (involving district, major subordinate command, and PCX and Headquarters members) that the review of the covered subject matter (including data, use of models, assumptions, and other scientific and engineering information) is triggered by one or more of the following factors.

b. Type I IEPR. Any of the following factors require a Type I IEPR:

(1) Significant threat to human life. The decision document phase is the initial concept design phase of a project. Therefore, when life safety issues exist, a Type I IEPR that includes a Safety Assurance Review (SAR) is required.

(2) Total Project Cost > \$45M. In considering the \$45 million cost trigger, the term “total cost”, means the cost of construction (including planning and designing) of the project and includes lands, easements, rights of way, relocations, and disposal areas (LERRDs). In the case of a project for hurricane and storm risk management or flood risk management that includes periodic nourishment over the life of the project, the term includes the total cost of the nourishment. The total cost shall be based upon the reasonable USACE estimates at the completion of the reconnaissance study for the project. If the reasonable estimate of total costs is subsequently determined to be in excess of \$45 million the MSC will determine if the Review Plan should be modified.

(3) A request by a State Governor of an affected state ( all or a portion of a state which is within the drainage basin in which the project is or would be located and would be economically or environmentally affected as a consequence of the project).

(4) A request by the head of a Federal or state agency charged with reviewing the project study if he/she determines that the project is likely to have a significant adverse impact on environmental, cultural, or other resources under the jurisdiction of the agency after implementation of proposed mitigation plans.

(a) A decision whether to conduct Type I IEPR must be made within 21 days of the date of receipt of the request by the head of the Federal or State agency.

(b) If the Chief of Engineers decides not to conduct a Type I IEPR following such a request the Chief shall make publicly available the reasons for not conducting the Type I IEPR.

(c) If the Chief of Engineers decides not to conduct an Type I IEPR following such a request, it may be appealed to the Chairman of the Council on Environmental Quality within

30-days of the Chief's decision and the Chairman shall decide the appeal within 30 days of the date of the appeal.

(5) Significant public dispute as to size, nature or effects of the project.

(6) Significant public dispute as to the economic or environmental cost or benefit of the project.

(7) Cases where information is based on novel methods, presents complex challenges for interpretation, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices.

(8) Any other circumstance where the Chief of Engineers determines Type I IEPR is warranted.

2. Type I IEPR Panels. Panels should also be able to evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable. To provide effective review, in terms of both usefulness of results and credibility, review panels should be given the flexibility to bring important issues to the attention of decision makers. However, review panels should be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision on a planning or reoperations study. External panels may, however, offer their opinions as to whether there are sufficient analyses upon which to base a recommendation. Type I IEPR panels will accomplish a concurrent review that covers the entire decision document or action. The panel will address all the underlying engineering, economics, and environmental work, not just one aspect of the project. This level of review is governed primarily by Sections 2034 and 2035 of WRDA 2007 and the OMB Peer Review Bulletin.

a. Establishment of Panels.

(1) For Type I IEPR, an outside eligible organization will select the reviewers according to the guidance in paragraph 2b, below. By statute, the Federal Advisory Committee Act does not apply to Type I IEPR panels.

(2) Eligible Organizations. Type I IEPR panels will be established by the responsible RMO through contract with an independent scientific and technical advisory organization that must be a 501(c)(3) (Internal Revenue Code of 1986) organization or with the National Academy of Sciences.

(3) The highest degree of credibility of external reviews will be achieved if the responsibility for coordinating the external review process is granted to an organization independent of USACE. Such an independent Outside Eligible Organization (OEO) must be in charge of selecting reviewers, all of whom should be independent of USACE and free of conflicts of interests. The OEO will also be assessed for potential organizational conflict of interest on a task order basis.

(4) The OEO that selects reviewers for projects should be knowledgeable of the USACE mission, its statutory authorities and related administrative regulations, and other evaluation procedures.

(5) The OEO shall have the following qualifications:

(a) Is described in section 501(c)(3), and exempt from Federal tax under section 501(a) of the Internal Revenue Code of 1986.

(b) Is independent

(c) Is free from conflicts of interest

(d) Does not carry out or advocate for or against Federal water resources projects;

(e) Has experience in establishing and administering independent review panels;

(f) Has proven ability to deliver under significant time constraints.

(6) Type I IEPR reviews will ultimately be more effective if the review panel maintains communication with USACE during the review. This communication, which should not compromise the review's independence, can help the review panel understand USACE assumptions and methods, as well as the practical implications of the review panel's finding and recommendations. The OEO should coordinate this communication between the district, RMO (usually PCX for planning studies) and review panel, as well as communication between the panel and relevant federal agencies, interest groups, and the public.

b. Guidelines for Selection. The three most important considerations in selecting reviewers are the credentials of the reviewers (which include affiliations as well as expertise), the absence of conflict of interest, and the independence of the group that selects the reviewers. The OEO should select reviewers and structure the review such that good science, sound engineering, and public welfare are the most important factors producing a sound review.

(1) All potential reviewers carry professional and personal biases, and it is important that these biases be disclosed when reviewers are considered and selected. The OEO leading the review shall determine which biases, if any, will disqualify prospective reviewers. It shall also develop criteria for determining if review panels are properly balanced, both in terms of professional expertise as well as in points of view on the study or project at hand.

(2) There is also a challenge of selecting review panels that are viewed as credible and balanced, but that also have adequate knowledge of USACE's often highly complex guidance and analytical methods.

c. Panel Responsibilities. The panel of experts established for a review for a project shall:

(1) Conduct the review for the subject project in a timely manner in accordance with the study and RP schedule;

(2) Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in evaluation of economic or environmental impacts of proposed projects, and any biological opinions of the project study.

(3) For those decision documents where a Safety Assurance Review is required as defined in Appendix E, the panel should address the following questions for the selected alternative:

(a) In accordance with ER 1110-2-1150, is the quality and quantity of the surveys, investigations, and engineering sufficient for a concept design?

(b) Are the models used to assess hazards appropriate?

(c) Are the assumptions made for the hazards appropriate?

(d) Does the analysis adequately address the uncertainty and residual risk given the consequences associated with the potential for loss of life for this type of project?

(4) Assess the considered and recommended alternatives from the perspective of systems. This includes (but is not limited to) aspects such as the hydraulic and hydrologic effects throughout a watershed, the impact on competing ports within an area of influence, or the impacts on resources used by transiting migratory species. It should also include systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

(5) Receive from USACE any public written and oral comments provided on the project;

(6) Provide timely written and oral comments throughout the development of the project, as specified in the scope of work with the OEO; and

(7) Submit a final report, no more than 60 days following the close of the public comment period for the draft project study to enable the district to address all necessary actions before the final report is signed. The report will contain the panel's economic, engineering, and environmental analysis of the project study, including the panel's assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used. All comments in the report will be finalized prior to their release to USACE for each study phase. If the panel does not complete its review in this period, the processing of the report will continue without delay.

d. Panel Recommendations.

(1) The panel will submit to USACE through the managing organization a final report containing the panel's economic, engineering, and environmental analysis of the project study, including the panel's assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used by the Corps of Engineers.

(2) The report from the panel of experts will be considered and documentation presented on how issues were resolved or will be resolved by the District Engineer before the district report is signed. The recommendations and responses will be presented to the DCG-CEO by the District Engineer with a Type I IEPR panel or OEO representative participating, preferably in person.

(3) After receiving a report on a project from a panel of experts, USACE shall consider all recommendations contained in the report and prepare a written response for all recommendations adopted or not adopted. Written recommendations of a reviewer or panel of reviewers and the responses of USACE shall be made available to the public, including through electronic means on the Internet. The panel's final report and the responses of USACE shall also accompany the publication of any report of the Chief of Engineers for the project. In cases where there is no Chief's report, the DCW will certify the agency response.

e. Guidelines for Developing the "Charge."

(1) Reviews should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. A review panel should bring important issues to the attention of the agency. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. However, review panels should be instructed to not present a final judgment on whether a project should be constructed or whether a particular operations plan should be implemented, as the Chief of Engineers is ultimately responsible for this final decision.

(2) Peer reviews, no matter how useful, should not be expected to resolve fundamental disagreements and controversies. Reviewers should aim to draw distinctions between criticisms of the regulations and guidelines and criticisms of how well USACE conformed to the guidance. Reviews should focus on assumptions, data, methods, and models.

(3) Reviews will assist USACE in making decisions, but reviewers should not be asked to make decisions. Reviewers should avoid findings that become "directives" in that they call for modifications or additional studies or suggest new conclusions and recommendations. In such circumstances the reviewers may have assumed the role of advisors as well as reviewers, thus introducing bias and potential conflict in their ability to provide objective review later in the project. Reviewers engaged in the review processes should be selected based upon their independence and professional expertise and should not be "stakeholders".

(4) The MSC's choice about the appropriate level of review should be informed by deliberation with the vertical team.

(5) Frequent communication will help the review panel understand the technical and practical implications of its recommendations. Review panels should highlight areas of disagreement and controversies that may need resolution.

(6) An issue that frequently arises in review, and one not always easily agreed upon, is defining a review panel's boundaries of inquiry. It is not uncommon for an agency or other administrative group to try to limit a review panel's deliberation. However, the line between technical and policy issues is often blurred, and it is often difficult to clearly separate them. USACE should accept comments, but make a distinction in responses when comments pertain to policy which is beyond the scope of a Type I IEPR, but elevated to HQUSACE for consideration under a non-project specific policy review. It is important that panelists focus on their review, and not become defenders of their recommendations.

f. Record of Review. USACE shall make all written recommendations of a reviewer or panel of reviewers and related USACE responses available to the public, including through electronic means on the Internet.

### 3. Planning Centers of Expertise.

a. PCXs are responsible for the accomplishment and quality of Type I IEPR for documents covered by this Circular. In cases where the Type I IEPR includes SAR, the PCX will coordinate with the USACE Risk Management Center in developing the charge. Centers must use outside eligible organizations to manage the selection of panels, the conduct of the review, and the organization and disposition of comments.

b. Review will be assigned to the appropriate USACE PCX based on business programs. Districts shall develop Review Plans in coordination with the Centers based on the primary purpose of the basic decision document to be reviewed.

c. For decision documents with multiple purposes (or project purposes not clearly aligned with the PCXs), the home MSC will designate a lead PCX to conduct the review after coordinating with each of the relevant Centers. The assigned PCX will coordinate with other PCX and offices to ensure that a review team with appropriate expertise is assembled.

d. Each PCX must coordinate with the Cost Engineering Mandatory Center of Expertise (MCX) at the Walla Walla District. In cases where the Cost Engineering MCX identifies the need for Type I IEPR, it will inform the assigned PCX and will assist the PCX with establishing the charge for the independent external peer review.

### 4. Reporting Requirements.

a. When it is determined that IEPR will be undertaken, the Chief of Engineers is required to notify the Committee on Environment and Public Works of the Senate and the Committee

on Transportation and Infrastructure of the House of Representatives of the review, prior to the initiation of peer review. Upon MSC approval of each RP with Type I IEPR, the MSC will provide a copy of the signed MSC Approval Memo to its respective HQUSACE RIT. The RIT will then process a notification letter, signed by the Director of Civil Works (DCW) to both the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives with a copy to ASA (CW).

b. Public Availability and Transmittal to Congress. After receiving a report on a project study from a panel of experts under this Circular, the Chief of Engineers (through the respective HQUSACE RIT) shall:

(1) Post the panel report on the HQUSACE public website within ten days of receipt of the report.

(2) Make a copy of the report, and any written response of the Chief of Engineers on recommendations contained in the report, available to the public by electronic means, including the Internet; and

(3) Transmit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a copy of the report, together with any such written response, on the date of a final report of the Chief of Engineers or other final decision document for the project study.

c. Annual Report. By 1 November each year, each MSC shall provide HQUSACE, through their respective RIT, a summary of the Type I IEPRs undertaken by the MSC during the previous fiscal year. CECW- P will consolidate the summaries received by the RITs and will provide the Administrator of the Office of Information and Regulatory Affairs in the Office of Management and Budget with a consolidated summary of USACE Type I IEPRs by 15 December of each year. Annual summaries of Type I IEPRs shall include:

(1) The number of Type I IEPRs conducted subject to this Circular and the authorities under which each IEPR was conducted.

(2) The number of times alternative procedures were invoked.

(3) The number of times waivers or deferrals were invoked (and in the case of deferrals, the length of time elapsed between the deferral and the Type I IEPR).

(4) Any decision to appoint a reviewer pursuant to any exception to the applicable independence or conflict of interest standards of the OMB Peer Review Bulletin, including determinations by the Secretary of Defense pursuant to Section III (3)(c) of the OMB Peer Review Bulletin.

(5) The number of Type I IEPR panels that were conducted in public and the number that allowed public comment.

(6) The number of public comments provided on each Civil Works Review Plan.

(7) The number of peer reviewers that the Center used that were recommended by professional societies.

d. Report on implementation of Section 2034 of WRDA 2007.

(1) Not later than 8 November 2010, the Chief of Engineers shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report on the implementation of this section. (Completed)

(2) Not later than 8 November 2013, the Chief of Engineers shall update the previous report taking into account any further information on implementation of this section and submit such updated report to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives.

## APPENDIX E

### Type II - IEPR, Safety Assurance Review (SAR)

#### 1. General.

a. A Type II IEPR SAR shall be conducted on design and construction activities for any project where potential hazards pose a significant threat to human life. The District Chief of Engineering, as the Engineer in Responsible Charge, needs to assess whether the threat is significant and document that in the Review Plan. A recommendation to not conduct a SAR shall (like any Review Plan recommendation) have the endorsement of the RMO prior to approval of the Review Plan. This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities. External panels will review the design and construction activities prior to initiation of physical construction and periodically thereafter until construction activities are completed. Since design initiates in the decision document phase, Appendix D, paragraph 2.c.4 incorporates the SAR into the Type I IEPR. Appendix E provides guidance for reviews conducted on design and construction activities performed after the approval of a decision document. The review shall be on a regular schedule sufficient to inform the Chief of Engineers on the adequacy, appropriateness, and acceptability of the design and construction activities for the purpose of assuring that good science, sound engineering, and public health, safety, and welfare are the most important factors that determine a project's fate.

b. When a Type II review is included in the project's approved Review Plan, the District Chief of Engineering, as the Engineer-In-Responsible-Charge, is responsible for ensuring the Type II review is conducted in accordance with this Circular, and will fully coordinate with the Chief of Construction, the Chief of Operations, and the project manager through the Pre-Engineering and Design (PED) and construction phases. The project manager will coordinate with the RMO to develop the review requirements and to include them in the Review Plan. The default RMO for flood risk management projects and Type II reviews is the USACE Risk Management Center (RMC). If the RMC and MSC agree that a Type II review does not need to be conducted, the MSC may assume RMO responsibilities for the implementation phase. Any such a transfer of responsibility should be mutually agreed upon and mindful of all the remaining phases of the project.

2. Risk Informed Decision. Any project the Federal action is would pose a significant threat to human life (public safety) requires a Type II review. Other factors to consider for conducting a Type II review of a project or components of a project are:

a. The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices;

b. The project design requires redundancy, resiliency, and robustness.

(1) Redundancy. Redundancy is the duplication of critical components of a system with the intention of increasing reliability of the system, usually in the case of a backup or fail-safe.

(2) Resiliency. Resiliency is the ability to avoid, minimize, withstand, and recover from the effects of adversity, whether natural or manmade, under all circumstances of use.

(3) Robustness. Robustness is the ability of a system to continue to operate correctly across a wide range of operational conditions (the wider the range of conditions, the more robust the system), with minimal damage, alteration or loss of functionality, and to fail gracefully outside of that range.

c. The project has unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

3. Review Plans. As detailed in Appendix B, the Review Plan (RP) shall include the SAR or an explanation as to why an SAR is not required. The MSC Commander's approval of the RP is required to assure that the plan is in compliance with the principles of this guidance and the MSC Quality Management Plan and that all elements of the command have agreed to the review approach. The RP must anticipate and define the appropriate level of review.

#### 4. Timing of Reviews.

a. The SAR team shall perform reviews and site visits in accordance with milestones identified in the Review Plan. Milestones to consider for an SAR are at the record of final design in the Design Documentation Report; at the completion of the plans, specifications, and cost estimate; at the midpoint of construction for a particular contract, prior to final inspection, or at any critical design or construction decision milestones. The SAR panel may recommend to the RMO additional or alternate milestones. The MSC should approve these recommendations when they are warranted and reasonable.

b. Note that the SAR is an extension (not a replacement) of the ATR (formerly Independent Technical Review) requirements outlined in ER 1110-1-12, Engineering and Design Quality Management (or a subsequent edition under development, EC 1165-2-xxx, Quality Management for Civil Works); however, the intent of the SAR is to complement the ATR and to avoid impacts to program schedules and cost. Where appropriate and reasonable, the District can conduct the ATR and SAR concurrent and in concert if it enhances the review process. The SAR is a strategic level review and every effort should be made to avoid having the SAR duplicate the ATR.

#### 5. Guidelines for Developing the Scope of Work or "Charge".

a. The review shall cover the design and construction phase of the project as outlined below.

b. Reference Appendix D, paragraph 2.e for guidelines for developing the “Charge”.

c. The review plan should establish a milestone schedule aligned with critical features of the project design and construction. The review should complement the ATR and focus on unique features and changes from the assumptions made and conditions that formed the basis for the design during the decision document phase.

d. IEPR panels should be able to evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable. In terms of both usefulness of results and credibility, review panels should be given the flexibility to bring important issues to the attention of decision makers. However, review panels should be instructed to not make a recommendation on whether a particular alternative should be implemented, as the Chief of Engineers is ultimately responsible for the final decision. External panels may, however, offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

e. For the decision document phase, the review requirements are defined in Appendix D and included in the Type I review.

f. For the PED or design phase, the SAR should focus on unique features and changes from the assumptions made and conditions that formed the basis for the design during the decision document phase. The SAR shall address the following questions:

(1) Do the assumptions made during the decision document phase for hazards remain valid through the completion of design as additional knowledge is gained and the state-of-the-art evolves?

(2) Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?

(3) Do the project features and/or components effectively work as a system?

g. For those unique projects authorized and appropriated or approved without a decision document and in the PED or design phase, the SAR shall address the following questions:

(1) Are the models used to assess hazards appropriate?

(2) Are the assumptions made for the hazards appropriate?

(3) Is the quality and quantity of the surveys, investigations, and engineering for the design in accordance with ER 1110-2-1150 sufficient to support the models and assumptions made for determining the hazards?

(4) Does the analysis adequately address the uncertainty given the consequences associated with the potential for loss of life for this type of project?

(5) Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?

(6) From a public safety perspective, is the proposed alternative reasonably appropriate or are there other alternatives that should be considered?

(7) Is the environmental assessment reasonably comprehensive or are there significant environmental impacts that should be considered.

(8) Assess the recommended alternatives from the perspective of systems. This includes (but is not limited to) aspects such as the hydraulic and hydrologic effects throughout a watershed, the impact on competing ports within an area of influence, or the impacts on resources used by transiting migratory species. It should also include systemic aspects being considered from a temporal perspective, including the potential effects of climate change.

h. For the construction phase, the SAR shall address the following questions:

(1) Do the assumptions made during design remain valid through construction as additional knowledge is gained and the state of the art evolves?

(2) For O&M manuals, do the requirements adequately maintain the conditions assumed during design and validated during construction; and will the project monitoring adequately reveal any deviations from assumptions made for performance?

6. Requirements for Establishing Type II – IEPR Panels.

a. RMO Responsibilities.

(1) The RMO is responsible for ensuring the panels are established in accordance with this Circular. To avoid potentially triggering the requirements of the Federal Advisory Committee Act (FACA), all Type II – IEPR panels shall be established in accordance with this circular. The following requirements do not apply to Type I - IEPR panels established pursuant to Section 2034 of WRDA 2007.

(2) The RMO shall define the required competencies for each of the panel members insuring a balance of perspectives and may specify a particular expertise as the team lead. It can recommend candidates for consideration.

b. Review team led by and composed of other government employees.

(1) As noted in body of the regulation, section 16, Administration, peer reviews performed solely by Federal employees other than USACE or state, local and Tribal government employees do not trigger FACA.

(2) For projects where the panel composition is one person, FACA does not apply; however, the practice of establishing a panel composed of reviewers reporting as individuals to avoid FACA is not an acceptable practice.

c. Review team led by and composed of contractors.

(1) A contractor can be used to carry out these panels, including selecting panel members for the Type II- IEPR panel. Type II IEPR panels established by USACE personnel may require compliance with FACA and should only be established after consultation with local counsel. Unlike Type I – IEPR panels, competition for Type II – IEPR contractors may not be limited to OEOs. The solicitation for such a contract should include the minimum professional requirements for panel members, but should not be so narrowly written that only specific persons may be selected.

(2) Due to potential organizational conflicts of interest and the potential for contractors to have access to other contractors' information, contracting officers must be particularly aware of potential conflicts of interest and avoid or mitigate them in accordance with FAR Part 9 when procuring Type II – IEPR panel services. In addition, solicitations must include non-disclosure agreements and language analogous to that found in the Army Source Selection manual for contractors who assist in evaluations of proposals to ensure that contractor information is protected from disclosure by reviewing contractors. If an existing contract is considered for use, the Contracting Officer must determine that this work would be in scope of the contract scope and determine, if non-disclosure agreements and organizational conflict of interest language is not included in the contract, whether they could be added to the contract as an in scope modification before the existing contract may be used for a Type II – IEPR panel.

d. Guidance for the contractor (or USACE) for establishing review teams.

(1) If the panel meetings will be closed to the public, then the contractor should establish a process for members of the public to apply for membership on the panel. The contractor, however, is not under any obligation to select any of these public applicants.

(2) The RMO and other USACE officials may approve the panel members selected by the contractor, but should not participate in the vetting or selection of members. Moreover, USACE officials should not veto or disapprove of a selected panel member unless the selected panel member does not meet the objective criteria for panel members provided to the contractor.

(3) The contractor shall be required in the solicitation and instructions to apply the National Academy of Science's policy for selecting reviewers to ensure the panel members have no conflict of interest with the project being reviewed. The following website provides academy guidance for assessing composition and the appropriate forms for prospective panel members in General Scientific and Technical Studies:

<http://www.nationalacademies.org/coi/index.html>. The contractor shall also develop criteria for determining if review panels are properly balanced, as defined by criteria in the contract,

both in terms of professional expertise as well as in points of view on the study or project at hand. If necessary, the contractor shall remove and replace panel members during a review if a conflict arises.

(4) In developing a solicitation package for Type II IEPR review services, the District should consider the following considerations presented in *Review Procedures for Water Resources Project Planning*, National Research Council of the National Academies, 2002:

(a) All potential reviewers carry professional and personal biases, and it is important that these biases be disclosed when reviewers are considered and selected. The contractor leading the review shall determine which biases, if any, will disqualify prospective reviewers. It should also develop criteria for determining if review panels are properly balanced, both in terms of professional expertise as well as in points of view on the study or project at hand.

(b) There is also a challenge of selecting review panels that are viewed as credible and balanced, but that also have adequate knowledge of USACE's often highly complex guidance and analytical methods.

(c) The most important considerations in selecting reviewers are the credentials of the reviewers (which include affiliations as well as expertise) and the absence of conflict of interest.

(5) The contractor shall be responsible for adjusting the panel membership as necessary to maintain the skill set necessary as the project progresses and the need for different expertise arises.

(6) USACE officials may attend panel meetings, but may not participate in the management or control of the group. In other words, USACE can't be a voting member of the group, may not direct activities at the meetings, and may not develop the agenda for the meetings.

(7) USACE officials must refrain from participating in the development of any reports or final work product of the group.

(8) The peer review panel can take the form of a panel of consultants, but the members are limited to reviewing and commenting on the work being done by others. The peer review can work concurrent with on-going work, be interactive as needed, and provide real time over the shoulder input. Timely input on the appropriateness of hazard analyses, models and methods of analysis used, and the assumptions made is critical to maintaining project schedules.

(9) At a minimum, one member is required, but the panel composition shall be a size appropriate for the size and complexity of the project. Composition of the panel can change depending on the need of the particular phase of review.

7. Panel Responsibilities. The panel of experts established for a review for a project shall:

- a. Conduct the review for the subject project in a timely manner in accordance with the study and RP schedule;
- b. Follow the “Charge”, but when deemed appropriate by the team lead, request other products relevant to the project and the purpose of the review.
- c. Receive from USACE any public written and oral comments provided on the project;
- d. Provide timely written and oral comments throughout the development of the project, as requested; and
- e. Assure the review avoids replicating an ATR and focuses on the questions in the “Charge”, but the panel can recommend additional questions for consideration. The SAR panel may recommend to the RMO additional or alternate questions.
- f. Offer any lessons learned to improve the review process.
- g. Submit reports in accordance with the review plan milestones.
- h. The team panel lead shall be responsible for insuring that comments represent the group, be non-attributable to individuals, and where there is lack of consensus, note the non-concurrence and why.

8. Record of Review. The review team will prepare a review report. All review panel comments shall be entered as team comments that represent the group and be non-attributable to individuals. The team lead is to seek consensus, but where there is a lack of consensus, note the non-concurrence and why. A suggested report outline is an introduction, the composition of the review team, a summary of the review during design, a summary of the review during construction, any lessons learned in both the process and/or design and construction, and appendices for conflict of disclosure forms, for comments to include any appendices for supporting analyses and assessments of the adequacy and acceptability of the methods, models, and analyses used. All comments in the report will be finalized by the panel prior to their release to USACE for each review plan milestone.

9. District Responsibilities to Complete the SAR Report.

- a. The host district Chief of Engineering is responsible for coordinating with the RMO, for attending review meetings with the SAR review panel, communicating with the agency or contractor selecting the panel members, and for coordinating the approval of the final report with the MSC Chief of Business Technical Division.
- b. After receiving a report on a project from the peer review panel, the District Chief of Engineering, with full coordination with the Chiefs of Construction and Operations, shall consider all comments contained in the report and prepare a written response for all

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comments and note concurrence and subsequent action or non-concurrence with an explanation. The District Chief of Engineering shall submit the panel's report and the Districts responses to the MSC Chief of Business Technical Division for final review and concurrence. The final report is then presented to the MSC Commander for approval. After MSC Commander approval, the report and responses shall be made available to the public on the District's website.

## APPENDIX F

## Roles and Responsibilities

## DISTRICT:

- Prepare Review Plan (RP) as part of PMP to include scope of review, data and models, etc.
- Post/Publish RP on website with MSC approval memo
- District Quality Control (DQC) conducted and documented at appropriate times
- PDT is responsible for a complete reading of the report prior to District Commander approval
- Complete all document reviews prior to signature from District Commander
- Seek issue resolution support from MSC
- Update RP to include review strategy for PED and Construction phases, to present at CWRB
- Draft proposed response to IEPR review report & coordinate with RMO
- When USACE response to IEPR is issued, District will disseminate final Review Report, USACE response & other materials to post on website and include in Decision Document

## MSC:

- Establish Quality Management Plan (to include discussion of how DQC will be conducted and documented in Districts) and execute procedures
- Approve all Review Plans (and updates), assuring RMO endorsement and vertical team participation
- Support the District for ATR issue resolution
- Maintain and update agenda (list) of Review Plans
- Coordinate and provide input to Type I IEPR annual report
- Approves final Agency Response to Type II IEPR review reports

## RMO (applicability varies by product under review):

- Coordinate all Review Plans, including agreement on scope and details of effort
- Assign ATR team and ensure that lead is outside home MSC
- Obtain the services of the Cost Engineering MCX for review and certification of cost estimates
- Manage the ATR
- For Type I IEPR, contract with Outside Eligible Organization (OEO), and for Type II IEPR, contract with an A/E contractor or arrange with another government agency to manage IEPRs
- Assist District with preparing written responses to the IEPR review report
- For Type I IEPR, participate in Agency Decision Milestone/CWRB

## HQUSACE:

- Complete policy reviews
- Participate in issue resolution
- Conduct Agency Decision Milestone/CWRB

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- For feasibility studies, release draft Chief's report and decision documents for public review
- Approve or deny requests for exclusions from Type I IEPR
- Review requests to use NAS for Type I IEPR
- Consider the District's proposed response to the Type I IEPR review report
- Determine appropriate command level for issuing formal USACE response to Type I IEPR review report

ALL:

- Uphold professional standards
- Communicate well and often
- Learn from prior reviews
- Share your PDT's lessons learned with the rest of the Community of Practice

## APPENDIX G

## Special Cases and Provisions

1. This section modifies the policy requirements in this circular for the specific cases outlined below; special provisions found in this appendix do not extend to projects or programs not explicitly identified in this appendix.

2. Continuing Authorities Program (CAP) – This special provision modifies the general requirements for decision documents to facilitate program execution and simplifying policy requirements for this program. Accountability for compliance with existing policy and these modifications remains with the MSC. Inspections will be conducted to ensure that the program is being executed in accord with guidance. The individual authorities known collectively as the CAP are: Section 14, Flood Control Act of 1946 (PL 79-526), as amended, for emergency streambank and shoreline erosion protection for public facilities and services; Section 103, River and Harbor Act of 1962 (PL 87-874), as amended, amends PL 727, an Act approved August 13, 1946 which authorized Federal participation in the cost of protecting the shores of publicly owned property from hurricane and storm damage; Section 107, River and Harbor Act of 1960 (PL 86-645), as amended, for navigation; Section 111, River and Harbor Act of 1968 (PL 90-483), as amended, for mitigation of shoreline erosion damage caused by Federal navigation projects; Section 204, Water Resources Development Act of 1992 (PL 102-580), as amended, for beneficial uses of dredged material; Section 205, Flood Control Act of 1948 (PL 80-858), as amended, for flood control; Section 206, Water Resources Development Act of 1996 (PL 104-303), as amended, for aquatic ecosystem restoration; Section 208, Flood Control Act of 1954 (PL 83-780), as amended, originally Section 2, Flood Control Act of August 28, 1937 (PL 75-406) for snagging and clearing for flood control; and Section 1135, Water Resources Development Act of 1986 (PL 99- 662), as amended, project modifications for improvement of the environment.

a. For CAP projects, the review policy is modified as follows:

(1) All CAP projects are excluded from Type I Independent External Peer Review (IEPR) except Section 205 and Section 103, or those projects that include an EIS or meet the mandatory triggers for Type I IEPR as stated in Appendix D.

(2) Exclusions from Type I IEPR for Section 205 and Section 103 projects will be approved on a case by case basis by the MSC Commander, based upon a risk informed decision process as outlined in the Appendix D. That approval may not be delegated.

(3) Type II IEPR is still required for those CAP projects where life safety risk is significant as documented in the approved Review Plan.

(4) Review Plans are required for all projects. MSC's are strongly urged to adopt a programmatic approach to review of CAP projects; CAP programmatic review plans shall be approved by the MSC Commander.

(5) The Review Management Organization (RMO) for ATR for CAP projects may be the home MSC in lieu of a National Planning Center of Expertise (PCX). The PCXs will continue to serve in their roles of providing advice and may serve as the RMO under appropriate agreements with an MSC. The ATR lead is to be outside the home MSC unless the Review Plan justifies an exception and is explicitly approved by the MSC Commander.

(6) For CAP projects, ATR of the cost estimate may be conducted by pre-certified district cost personnel within the region as designated by the Walla Walla Cost MCX. The pre-certified list of cost personnel has been established and is maintained by the Cost MCX. The cost ATR member will coordinate with the Cost MCX for execution of cost ATR and cost certification. The Cost MCX will be responsible for final cost certification and may be delegated at the discretion of the Cost MCX.

(7) The Risk Management Center is only required for dam and levee safety projects. However, the MSC commander will ensure that all decision documents involving flood and coastal related risk reduction measures are fully and appropriately reviewed, all issues resolved, and that a consistent and appropriate level of communicating risk and uncertainty is reflected in the study documents.

3. SMART Planning – For SMART Planning products, the Review Plan shall document the reviews to be employed and milestones designating when they will be conducted. See the SMART Planning Guide in the Planning Toolbox for information about SMART Planning.

4. Non-Federal Activities at USACE Projects - Special cases exist where non-Federal interests undertake the study, design or implementation of a Federal project or a modification to a USACE project. Authorities for such actions include, but are not limited to, 33 USC 408, Sections 203 and 204 of WRDA 1986, Section 206 of WRDA 1992, and Section 211 of WRDA 1996. These types of activities are not a Corps product and the specific ATR requirements in this circular do not apply. However, as the intent of the non-federal interest may be to seek authorization for a federal project or modification of an existing project, use of and compliance with this EC may be advisable to help expedite an eventual USACE review and approval process. The host district should communicate the quality requirements expected from the non-federal interests and require a Review Plan that will be reviewed by the host district and approved by the host MSC Commander. The District should do a rigorous technical review commensurate with the risk of the proposed activities; reviewers can be from the host district. If lacking the appropriate expertise, the district should supplement their staff with outside subject matter experts. The district shall coordinate with their Headquarters Regional Integration Team (RIT) to ensure all necessary approvals are met throughout the process. See Paragraph 13 in this circular for discussion of IEPR requirements for non-federal activities at USACE projects.

## GLOSSARY

### Definitions and Acronyms

**Decision Document** - For application of the policy contained in this circular, a "decision document" is any product that provides analysis and recommendations for an Agency decision to obtain project authorization to commit Federal funds for project implementation or project modification. They are the basis for approval to spend/receive funds as a result of entering into agreements with other agencies or organizations including those to obtain Congressional authorization.

**Implementation Document** - For application of the policy contained in this circular, an "implementation document" is defined as a document prepared, generally subsequent to the decision document (e.g. Plans and Specifications), that supports project implementation or project modification in accordance with the decision document and its authorization.

**Peer Review** - the process of subjecting research, assumptions, analyses, and conclusions to the scrutiny of others who are experts in the same field. Peer review requires a community of experts in a given (and often narrowly defined) field, who are qualified and able to perform impartial review.

**Outside Eligible Organization** - An organization that:

- (1) is described in section 501(c)(3), and exempt from Federal tax under section 501(a), of the Internal Revenue Code of 1986;
- (2) is independent;
- (3) is free from conflicts of interest;
- (4) does not carry out or advocate for or against Federal water resources projects; and
- (5) has experience in establishing and administering peer review panels.

### List of Acronyms

AFB – Alternatives Formulation Briefing

ATR - Agency Technical Review

BCOE – Biddability, Constructibility, Operability and Environmental Review

CAP – Continuing Authorities Program

DCG-CEO – Deputy Commanding General of Civil and Environmental Operations

DCW – Director of Civil Works

DQC - District Quality Control

EC – Engineering Circular

EIS – Environmental Impact Statement

ER – Engineering Regulation

FACA – Federal Advisory Committee Act

FCSA – Feasibility Cost Sharing Agreement

FOIA – Freedom of Information Act

FY – Fiscal Year

HQUSACE – Headquarters, U. S. Army Corps of Engineers

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IEPR – Independent External Peer Review  
IPR – In Progress Review  
NED – National Economic Development  
NER – National Ecosystem Restoration  
MCX – Mandatory Center of Expertise  
MSC – Major Subordinate Command  
NAS – National Academy of Sciences  
NEPA – National Environmental Protection Act  
OEO – Outside Eligible Organization  
OMB – Office of Management and Budget  
OMRRR – Operations, Maintenance, Repair, Replacement and Rehabilitation  
PCX – Planning Center of Expertise  
PDT – Project Development Team  
PMP – Project Management Plan  
QA/QC – Quality Assurance / Quality Control  
QM – Quality Manual, the document specifying the QMS of an organization.  
QMP – Quality Management Plan  
QMS – Quality Management System  
RIT – Regional Integration Team (HQUSACE)  
RP – Project Review Plan  
RMC – Risk Management Center  
RMO – Review Management Organization  
RTS – Regional Technical Specialist  
SAR – Safety Assurance Review  
SME – Subject Matter Expert  
USACE – U. S. Army Corps of Engineers  
USC – United States Code  
WRDA – Water Resources Development Act



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St. Paul District

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## **Review Plan**

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# Fargo Moorhead Metropolitan Area Flood Risk Management Project

## **Overall FMM Project**

Engineering and Design Phase  
and  
Construction Phase

P2# 370365

6/18/2012

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# Review Plan

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# Review Plan

## 1 Purpose

This Review Plan, in coordination with the Project Management Plan (PMP), was developed in accordance with Engineer Circular (EC) 1165-2-209, “Civil Works Review Policy,” dated 31 January, 2010 as well as with QMS 8502-MVD, “Review Plans for Technical Products”.. The EC establishes procedures to ensure the quality and credibility of Corps implementation and operations and maintenance documents and work products. This Review Plan is a component of the Project Management Plan (PMP) for the Engineering and Design (E&D) Phase and the Construction Phase of the Fargo-Moorhead Metropolitan (FMM) Flood Risk Management Project (Feasibility P2 Project # 153866; PED P2 # 370365).

At the time that the initial version of this Review Plan was prepared, authorization and appropriations only allow for the initial stages of Planning, Engineering, and Design (PED) development; thus the Review Plan (RP) at this time pertains specifically to the Engineering and Design (E&D) Phase efforts for the overall FMM project. As future authorization and appropriations allow, this Review Plan will be amended to accommodate future work, ultimately through the construction phases of the project.

All appropriate levels of review (DQC, ATR, IEPR, Policy and Legal Review, and Model Review and Certification) will be addressed in this RP. The RP identifies the most important skill sets needed in the reviews and the objective of the review and the specific advice sought, thus setting the appropriate scale and scope of review for the individual document.

## 2 Applicability

The overall FMM project is a large, multi-faceted project that will be accomplished over the course of many years and many separately designed and constructed reaches/features. This Review Plan will serve as the approval document for defining the review strategy/requirements for all facets (sub-projects) of the overall project during the Engineering, and Design (E&D) Phase of the project. When this project is authorized for construction, either this Review Plan will be revised/updated or a new Review Plan will be prepared for the engineering during construction phase of the project.

Each of the sub-projects (i.e., reaches, features, etc) that will be designed/developed as part of the overall FMM project will have Reach Management Plan that defines the Review Teams and parameters specific to the sub-project. The Reach Management Plan will be combination of sorts of a project Quality Management Plan and a Review Plan. The Reach Management Plans for each of the sub-projects will not be submitted for approval; however, they will be submitted “for information only” to document the establishment of suitable review teams.

Current versions of this overall Review Plan and the Reach Management Plans for each of the sub-projects will be posted in the project’s extranet site for ready access by all internal and external entities

involved with the project. The URL for the extranet site is:

<https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/default.aspx>

### 3 References

a.	ER 1110-1-12	<i>Engineering and Design - Quality Management</i> , 21 July 2006, incorporating Change 1, 30 September 2006
b.	ER 1110-2-1150	<i>Engineering and Design for Civil Works</i> , 31 August 1999
c.	EC 1165-2-209	<i>Civil Works Review Policy</i> , 31 January 2010, with Errata Sheet 1 dtd 15 July 2010
d.	QMS 8502-MVD	<i>Review Plans for Technical Products</i>
e.	<i>Project Management Plan (PMP)</i> for the overall Fargo Moorhead Metropolitan Area Flood Risk Management Project	
f.	<i>Final Feasibility Report and Environmental Impact Statement</i> for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project, July 2011	
g.	Type I Independent External Peer Review (IEPR) documentation for the <i>Final Feasibility Report and Environmental Impact Statement</i> for the Fargo-Moorhead Metropolitan Area Flood Risk Management Project	
h.	Memo for Records (MFRs) that are developed to establish and/or clarify various engineering and design aspects for the Fargo-Moorhead Metropolitan Area Flood Risk Management	
i.		

Project related Reference documents can be found and will be maintained on the FMM Project Extranet site in the Shared Documents folder, see

[<https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/Shared%20Documents/Forms/SharePoint%20View.aspx>]

## 4 Project Description and Background Information

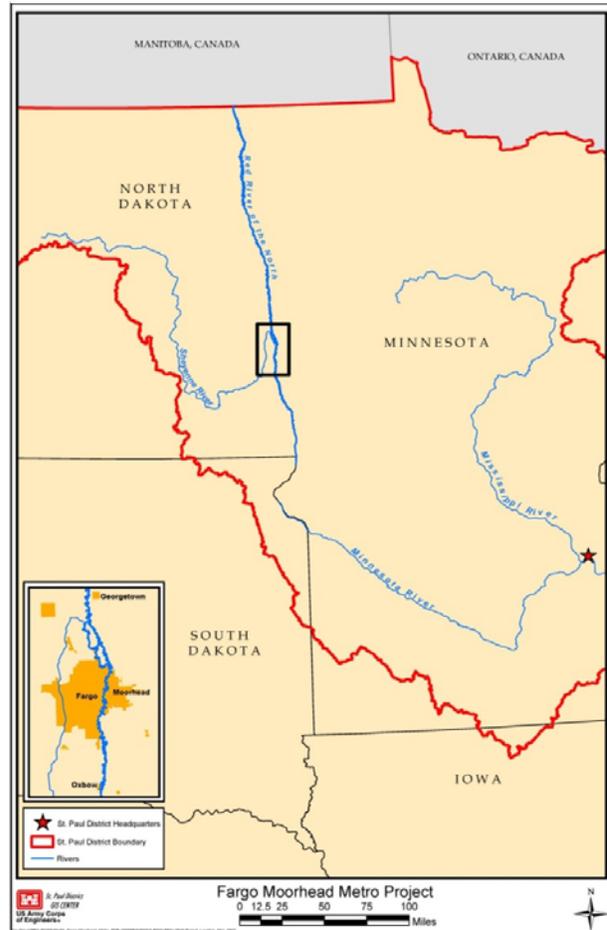
### 4.1 Location

The project area is the Fargo-Moorhead Metropolitan Area (FMM) and communities in the vicinity. The FMM area is located on the Red River of the North, but the Wild Rice, Sheyenne, Maple and Rush Rivers in North Dakota also cross the project area. Fargo and Moorhead are on the west and east banks of the Red River of the North, respectively, approximately 453 river miles south of the mouth of the river at Lake Winnipeg in Manitoba, Canada. **Figure 1** depicts the location of the project area in relation to the states of North Dakota and Minnesota.

The drainage area of the Red River of the North above the U.S. Geological Survey gauging station at Fargo is approximately 6,800 square miles, of which about 2,175 square miles do not contribute to runoff. At the FMM area, the Red River of the North valley is very narrow, generally 1,000 to 2,500 feet, and the adjacent terrain rises only 25 to 30 feet before becoming part of a plain that slopes toward the river at an average of 3 to 7 feet per mile. The north-south axis of the river valley bed has a gradient of about 1½ feet per mile; however, the meandering the channel gradient is about 1/2 foot per mile. The annual mean flow of the Red River of the North at the FMM area for the period of record (1901 to the present) averages approximately 677 cubic feet per second. The channel capacity of the Red River of the North in the FMM area is about 7,000 cubic feet per second.

The geological and geographical conditions leave the FMM area highly susceptible to flooding. Although the communities have demonstrated significant skill in defending themselves against floods, the efforts can be massive and highly disruptive to the communities and the people. Average annual flood damages in the FMM area are currently estimated at nearly \$196 million prompting the design of more permanent flood mitigation measures.

**FIGURE 1: FARGO-MOORHEAD METROPOLITAN AREA PROJECT LOCATION MAP**



## 4.2 Authorization

The project was authorized by the Fargo-Moorhead Metropolitan Area Reconnaissance Study, Section 905(b) (WRDA 1986) Analysis, North Dakota and Minnesota, dated March 2008 and is authorized by a 30 Sep 1974 Resolution of Senate Committee on Public Works:

“RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review reports on the Red River of the North Drainage Basin, Minnesota, South Dakota and North Dakota, submitted in House Document Numbered 185, 81st Congress, 1st Session, and prior reports, with a view to determining if the recommendations contained therein should be modified at this time, with particular reference to flood control, water supply, waste water management and allied purposes.”

## 4.3 Project Sponsors

The city of Fargo, North Dakota and the city of Moorhead, Minnesota are the project sponsors. As allowed by Article III (design coordination team) of the Design Agreement, the sponsors will receive credit for participating with the design team.

The project sponsors have been funded in part by the Buffalo-Red River Watershed District in Minnesota, the state of North Dakota, SE Cass Water Resources District in North Dakota and Cass County, North Dakota. The sponsors are supported by a number of supporting organizations including: the North Dakota State Water Commission, the Minnesota Department of Natural Resources, Joint Red River Water Resources Board, and West Fargo ND. The sponsors will provide 50% of all Pre-construction, Engineering, and Design (PED) costs through non-federal cash and in-kind contributions; the Corps of Engineers will fund the balance of PED costs. The sponsors will be part of the Project Delivery Team and will regularly participate in team meetings and decisions.

Federal funds to implement the PED phase were provided in the Consolidated Appropriations Act, 2008, approved 26 December 2007 (Public Law 110-161).

## 4.4 Project Background

The FMM Flood Risk Management Project will result in significant flood damage reduction for the project area. The project consists of a flood diversion channel on the North Dakota side of the Red River of the North. The 36-mile long diversion will consist of two control structures, four river crossings, diversion outlet, four new railroad bridges, and 19 new road bridges. The project is a single purpose flood risk management project with ecosystem and recreational objectives.

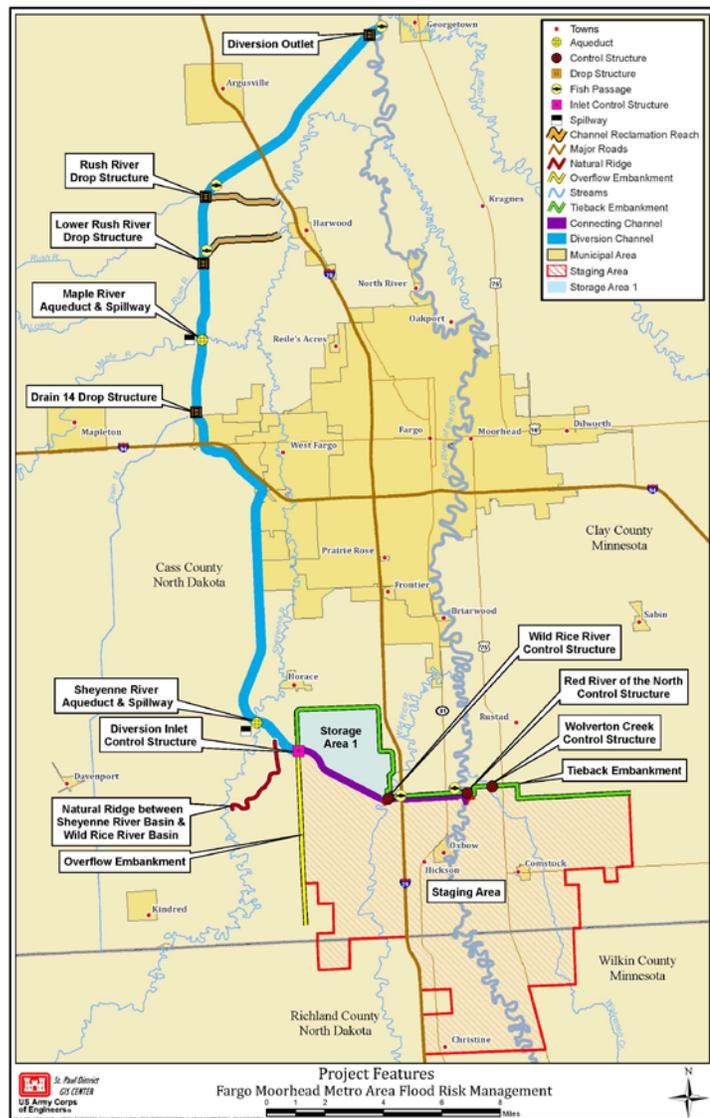
**Figure 2** depicts the project features in the vicinity of the Fargo-Moorhead Metropolitan Area; the locations of the mitigation sub-projects are not shown in this figure.

Average annual flood damages in the FMM area are estimated at more than \$64 million (Fargo-Moorhead Metropolitan Feasibility Study, Phase I). The FMM area has a relatively high risk of flooding. The highest river stages usually occur as a result of spring snowmelt, but summer rainfall events have also caused significant flood damages. The Red River of the North has exceeded the National Weather Service flood stage of 19 feet in 51 of the past 107 years, and every year from 1993 through 2009. The project area is between the Wild Rice River, the Sheyenne River, and the Red River of the North; interbasin flows complicate the hydrology of the region and contribute to extensive flooding.

The primary product of this project will be a flood diversion channel and associated structures and bridges that will reduce the flood risk to the FMM area up to a 0.2% chance flood.

Due to the size of the project, the volume of work to be completed, and the variability and long-term unpredictability of the Federal appropriations process, the PED phase will be completed in segments as funding allows. The general flow of PED starts with the Outlet Structure on the Red River of the North, just north of Fargo-Moorhead. The project will generally proceed upstream (southward), with the final elements designed and constructed being the Red River Control Structure and the tie-back levees extending into Minnesota.

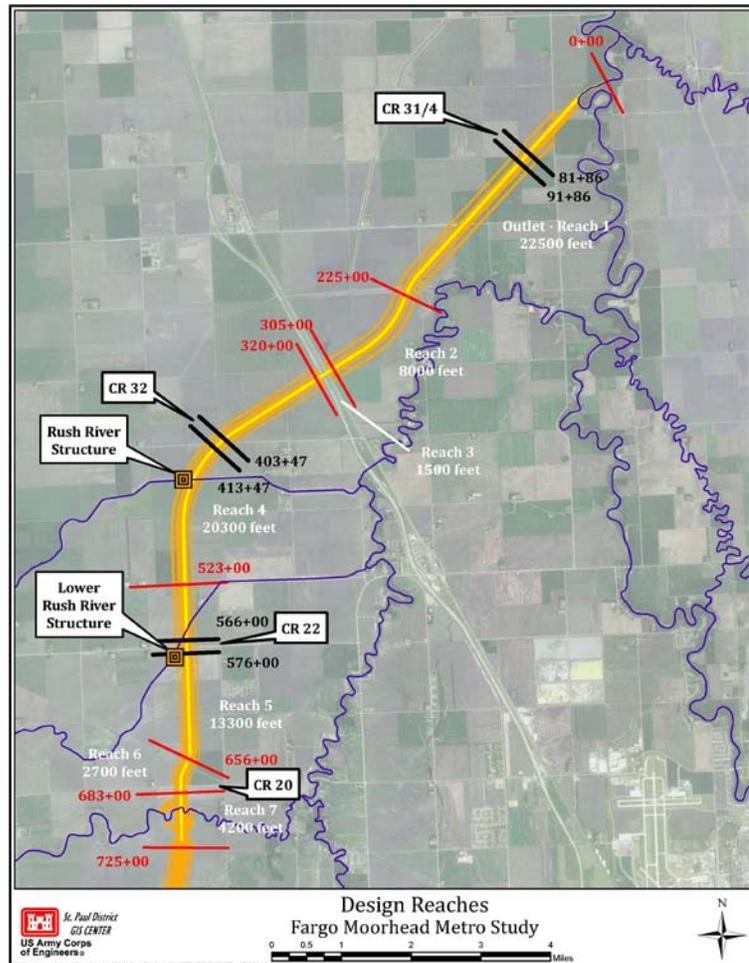
**FIGURE 2: MAJOR PROJECT COMPONENTS/FEATURES OF THE FARGO-MOORHEAD METROPOLITAN AREA PROJECT**



Fiscal Years 2012 and 2013 are dedicated strictly to design of the Outlet Structure, the first several reaches of the diversion, various bridge crossings, and several mitigation projects. **Figure 3** depicts the reaches/features that will be designed in FY12 and FY13; the locations of the mitigation sub-projects are not shown in this figure. Construction is estimated to begin in 2013 and lag behind design as the project progresses southward. Each element of the project, be it a reach of the diversion, a hydraulic structure, or a mitigation project, will undergo each design process in the PED phase and shall be reviewed by the IEPR Team.

The design of the various reaches/projects will be by accomplished by several USACE Districts, by Project Sponsor entities, and by A-E firms. The overall responsibility for coordination of engineering and design for all aspects of the project will be with the St. Paul District USACE.

**FIGURE 3: PROJECT REACHES (BETWEEN RED HASH MARKS) TO BE DESIGNED IN FY12 AND FY13**



#### 4.5 Description of Project Reaches and Features (Sub-Projects)

As stated previously, the overall project is divided into many sub-projects, and the design and construction of the overall project may span a decade or more. It is desired to have consistent ATR and IEPR review teams throughout the life of the project; as such, it is strongly recommended that the organizations selected to lead the ATR and IEPR efforts be able to make long-term commitments (five years or more) to leading and participating in these review commitments.

The following list of project facets that will need to have ATR and Type II IEPR SAR reviews performed on them is all inclusive for the life of the design of the overall project. Each of the facets will be identified as to the possible timeframe the design reviews will take place. At the time that this Review Plan is written, the project has not been authorized for construction, so it is impossible at this time to state if any post-design review or monitoring by the Type II IEPR SAR team will be required. It is anticipated

that all project facets will undergo DQC and ATR reviews; however, as stated in the following paragraphs, not all facets may need to have IEPR review.

#### **4.5.1 Design of Reach 1 and Outlet Structure – FY12 and FY13**

The design of Reach 1 and the Outlet Structure includes the formulation of the overall diversion channel. The project hydrology, the hydraulic capacity of the channel, and the geotechnical stability of the excavated channel and embankment berms will be significant items to be reviewed as decisions made at this point in the project design will affect/impact future engineering and design aspects of the project.

Reach 1 is the downstream-most portion of the diversion channel and includes an Outlet Structure where the diversion channel connects back into the Red River of the North. The Outlet Structure will be a rock ramp feature located approximately 5 miles east of Argusville, ND; the rock structure will be designed to accommodate fish passage. From the Outlet Structure, Reach 1 extends upstream to station 225+00 of the diversion channel. This reach will be designed with a sinuous low flow channel, will accommodate wetland mitigation within its main channel bottom, and will include outfall structures for County Drains 29 and 30. County Roads 173rd Avenue SE and 25th Street SE currently cross Reach 1's alignment. Depending on the Local Sponsors transportation design, one or both of these roads may require a bridge across the diversion. Design and review of plans and specifications for the Outlet Works and Reach 1 will be completed in FY12, with target construction award in FY13.

#### **4.5.2 Design of Reach 2 thru Reach 7 – FY12 and FY13**

Since these reaches are very similar in concept and design to Reach 1, a Type II IEPR SAR may not be warranted on one or more of these Reaches. The need for additional IEPR review of Reaches 2 thru 7 will be determined when: 1) the IEPR for Reach 1 is completed and, 2) the design of Reaches 2 thru 7 has progressed to the point where significant differences in the risk profile when compared to Reach 1 can be identified. The St. Paul District Review Management Committee will evaluate each Reach and make a determination if a Type II IEPR SAR is warranted for the particular Reach. If a Type II IEPR SAR is deemed to be warranted for any one of the Reaches 2 thru 7, the review will look only at significant differences in the designs for these reaches when compared to Reach 1.

Reaches 2, 4, 5, and 7 will be designed by USACE Districts within the Mississippi Valley Division; oversight for the design will be by the St. Paul District. Reaches 4 and 5 will each have rock structures where the Rush River and the Lower Rush River enter the Diversion Channel. These rock structures will be similar in design to the Outlet Structure in Reach 1.

Reaches 3 and 6, as well as 1000-ft long segments within Reaches 1, 4, and 5, will be designed by A-E firms under contract with the Project Sponsor. These reaches involve various highway and railroad bridges that cross over the Diversion Channel. The St. Paul District will provide oversight of the design of these reaches and ensure coordination of the diversion channel features that pass under these bridges. The design of these bridges will not be subject to Type II IEPR SAR.

#### **4.5.3 Design of Mitigation Project 1: Drayton Dam Fish Passage – FY12 and FY13**

The purpose of the Drayton Dam Fish Passage Mitigation Project is to offset unavoidable biotic connectivity (fish passage) impacts of the Fargo-Moorhead Metro diversion channel and associated structures. The selected alternative is a rock ramp fishway with a sheetpile cutoff located upstream of the existing dam. The rock ramp proposed is similar to other rock riffle fish passages constructed by the Corps on the Red River. The existing Drayton Dam will be removed. The project alternatives, and selected alternative, have been coordinated with the City of Drayton, with the non-federal cost-share sponsors of the FMM FRM project, and with the appropriate natural resource agencies. Design and review of plans and specifications for the Drayton Dam Project will be completed in FY13, with a target date for construction award of 30 September 2013.

#### **4.5.4 Design of Mitigation Project 2: Wild Rice Dam Fish Passage – FY12 and FY13**

The Wild Rice Dam is a potential site for improved fish passage based on upstream habitat quality, cost per habitat unit, stream area, and estimated cost. The design effort will evaluate the several alternatives for improved fish passage at Wild Rice Dam, including:

- Removal of Wild Rice Dam
- Construction of a rock ramp fishway at the existing dam. The rock ramp would be similar to other rock riffle fish passages constructed by the Corps on the Red River, including Riverside Dam in Grand Forks, ND.
- Removal of Wild Rice Dam and construction of a new dam with a rock ramp fishway.

In addition to environmental benefits, there are potential benefits for safety in the vicinity of the dam, and for stream bank stability. The project alternatives, and selected alternative, will be coordinated with the FMM non-federal cost-share sponsors, the Southeast Cass County Water Resource District (SE Cass Co. WRD), and the appropriate natural resource agencies. Design and review of plans and specifications for the Wild Rice Dam Project will be completed in FY13.

#### **4.5.5 Design of Sheyenne River Aqueduct and Maple River Aqueduct – Unknown FY**

Hydraulic structures, referred to herein as aqueducts, would be located where the diversion crosses the Sheyenne and Maple rivers. The aqueducts would allow flows in the diversion to pass underneath the existing river channel, while allowing non-flood flows to continue down the Sheyenne and Maple rivers. During floods on the Sheyenne and Maple rivers, flows in excess of a 50-percent chance event would be diverted into the diversion channel. The 50-percent chance event flows are intended to maintain existing geomorphologic processes and existing habitat conditions in the natural channels. The two crossing structure systems are similar in concept; each include a drop structure to prevent headcutting on the tributary, a spillway and channel to control diversion of tributary flows, and a hydraulic structure to pass a limited flow over the diversion channel to maintain the desired flow in the tributary beyond the diversion channel. Since these structures are rather novel/unique features, an Type II IEPR SAR may be warranted.

#### **4.5.6 Design of the Levee/Floodwall Through Town – Unknown FY**

In-town levees could be used to allow more flows through the existing Red River channel and could be part of an overall plan where it could be economically justified. This concept is currently being evaluated

#### **4.5.7 Design of the Red River Control Structure – Unknown FY**

The plan includes a large operable control structure on the Red River with three tainter gates 50 feet wide and 47 feet high. The gates would normally be fully open. The structure would not impede flow more than a typical highway bridge when not in operation. The structure would be operated only when the forecasted peak flow of the incoming hydrograph in the Red River of the North at the USGS gage in Fargo is greater than 9,600 CFS (approximately a 28-percent chance event). When it is operated, the control structure would limit the flow passing into the natural Red River channel through the metropolitan area and would back water up into the staging area and Storage Area 1.

#### **4.5.8 Design of the Wild Rice River Structure – Unknown FY**

The proposed Wild Rice River control structure, similar to the Red River control structure, would be an operable structure with two tainter gates 30 feet wide and 30 feet high. The gates would normally be fully open. The structure would not impede flow more than a typical highway bridge when not in operation. The structure would be operated only when the forecasted peak flow of the incoming hydrograph in the Red River of the North at the USGS gage in Fargo is greater than 9,600 CFS. The Wild Rice River control structure would be conceptually the same as the Red River control structure, except that the Wild Rice structure would have only two gates.

#### **4.5.9 Design of the Upstream Tie-back Levees – Unknown FY**

Tie-back levees at the inlet of diversion alternatives are crucial for diverting flows into the diversion channel. Approximately 10 miles of tie-back levees would be constructed to connect the Red River control structure and the diversion inlet weir to high ground and prevent water from circumventing the project. A gated culvert structure would be constructed where Wolverton Creek crosses the tie-back levee east of the Red River, in Minnesota. The project would go into effect when combined flows from the Wild Rice and Red Rivers equal 9,600 CFS; at that time water would start pooling upstream of the Wild Rice and Red River control structures.

#### **4.5.10 Design of the Upstream Storage Area – Unknown FY**

At this time, the project plan includes a 50,000 acre-foot storage area (Storage Area 1). Storage Area 1 is a 4,360-acre area on the north side of the diversion channel between the Wild Rice River and the Sheyenne River that will be formed by nearly 12 miles of embankments and will provide 50,000 ac-ft. of storage. Storage Area 1, combined with staging in the floodplain, will nearly eliminate impacts from the project on flood levels downstream of the diversion channel outlet. A tie-back levee along Cass County Road 17 (CR17) would be included to keep staged water from crossing overland into the Sheyenne River.

#### **4.5.11 Design of the Remaining Diversion Channel Reaches – Unknown FYs**

The remaining Diversion Channel Reaches, upstream of Reach 7 to the Upstream Storage Area, will be designed in increments such as for Reaches 1 through 7. These Reaches will be similar in design to the lower reaches.

## **5 Review Management Organization (RMO) and their Roles and Responsibilities**

### **5.1 Risk Management Center (RMC)**

Since this project is in the “design phase” of development, and since it is in essence a “flood risk management” project, the Review Management Organization (RMO) shall be the USACE Risk Management Center (RMC).

The RMC is responsible for:

- Reviewing and endorsing this Review Plan,
- Submitting the Review Plan to the MVD Commander for approval,
- Selecting the ATR and IEPR Teams for this project and its reaches/features,
- Assisting in developing the “Charge” for each of the ATR and IEPR teams, and
- Overseeing the IEPR and ensuring that the peer review is properly conducted.

Points of Contact for the RMC are listed in later portions of this document.

### **5.2 Mississippi Valley Division (MVD)**

MVD is responsible for:

- Approving the Review Plan,
- Assisting in developing the “Charge” for each of the ATR and IEPR teams, and
- Overseeing the ATR and ensuring that reviews are properly conducted.

Points of Contact for MVD are listed in later portions of this document.

## **6 Project Delivery Teams (PDTs) and Quality Review Teams**

Due to the long time duration of this project, and the many sub-projects that comprise the overall project, rather than including a static listing of reviewers for each of the different types of reviews, an up-to-date listing of DQC, BCOE, ATR, and IEPR reviewers that are assigned to each sub-project will be maintained on an Excel spreadsheet on the FMM Extranet site, see

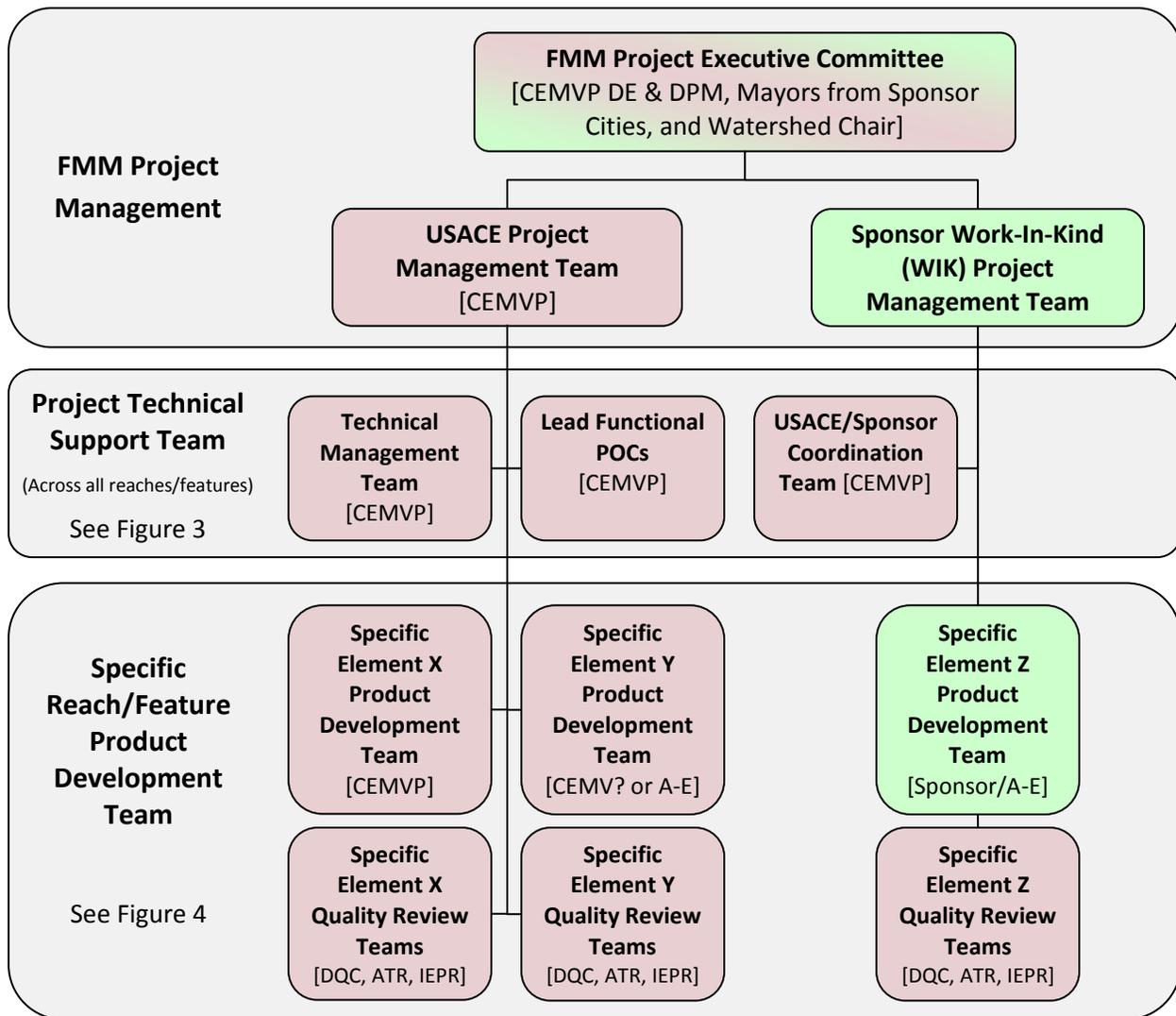
[\[https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/Shared%20Documents/01 Project Management Plan and Appendices/Review Management and QA-](https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/Shared%20Documents/01%20Project%20Management%20Plan%20and%20Appendices/Review%20Management%20and%20QA-)

[QC Info/FMM Review Teams Matrix.xlsx](#)]. Each of the major categories of reviews will be on a separate tab on the spreadsheet.

### 6.1 Overview

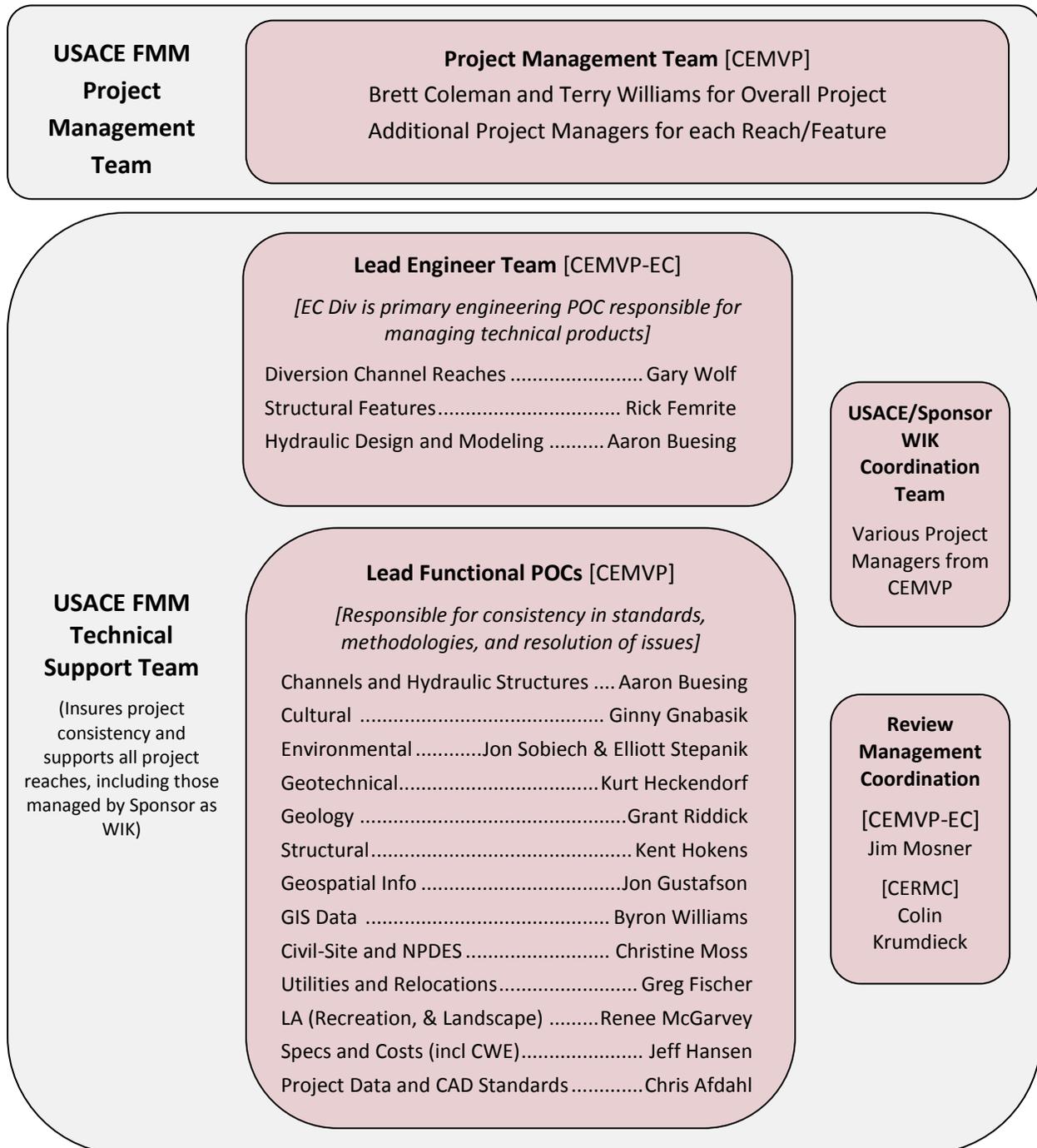
The Corps of Engineers-St. Paul District, the city of Fargo, North Dakota and the city of Moorhead, Minnesota are jointly implementing the project. Design of the numerous elements that comprise the project will be completed by the Corps and the local sponsors. This project will be regional in scale, incorporating other districts within the Mississippi Valley Division (MVD) as well as other divisions within the Corps. Work may be contracted to architect / engineer (AE) firms to perform portions of the design and review process. The concept for the management of the overall FMM project is illustrated in **Figure 4**. A listing of the names and contact information for the persons in the key positions is available in the PMP.

**FIGURE 4: FMM MANAGEMENT STRUCTURE FOR OVERALL PROJECT**



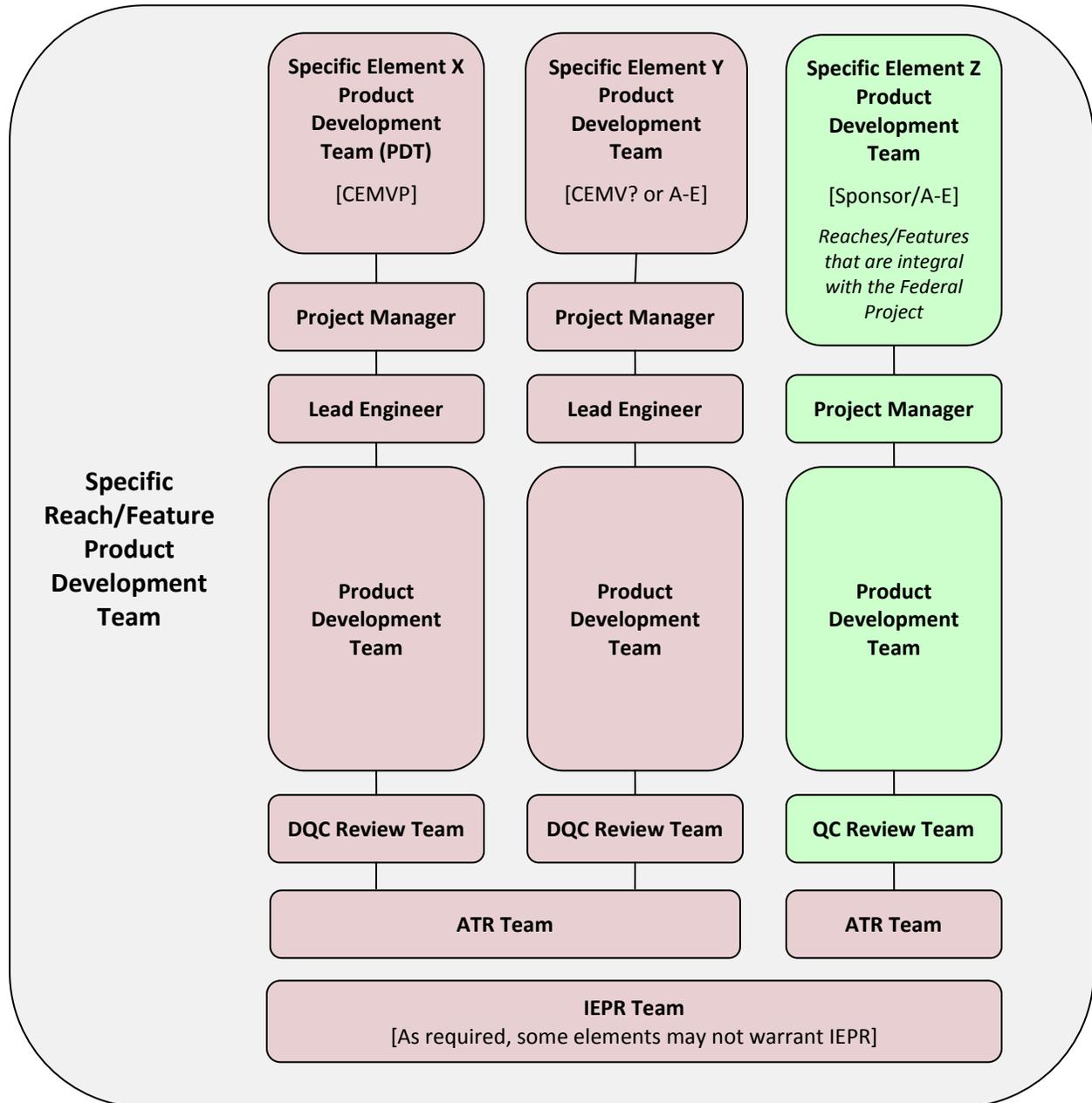
**Figure 5** defines the concept of the USACE Technical Support Team for the overall project. The goal of this Team is to ensure consistency of design and products across all the sub-projects that will be designed/developed. The Technical Support Team will be a primary component of the DQC Team as defined in Paragraph 6.2. This figure illustrates the relationships between the project PMs, the Lead Engineers, and the Lead Functional POCs.

**FIGURE 5: PROJECT TECHNICAL SUPPORT TEAM**



**Figure 6** illustrates that each of the sub-projects will have a dedicated District Quality Control Team as well as will have reviews by the Agency Technical Review (ATR) Teams and when appropriate reviews by the Independent External Project Review (IEPR) Team. The key thing to note in **Figure 6** is that it is intended to have a consistent ATR Team and IEPR Team across all the sub-projects that are designed/developed. Due to the expected number of sub-projects and the extended period of years that it will take to design/develop all the products, the ATR Team and the IEPR team will need to be robust.

**FIGURE 6: SPECIFIC REACH/FEATURE PRODUCT DEVELOPMENT TEAM**



In order to facilitate communication during the review process, upon creation of the PDT and the review panel for a specific product, contact information for the team members will be distributed. Distributed information will include lead points of contact, command structures, preferred methods of communication, anticipated delivery dates for all products, and other expectations and information as the parties deem necessary. Due to the regional nature of the project and in anticipation of various design and review teams, a new list shall be generated and distributed to all stakeholders upon commencement of each new element design.

## **6.2 District Quality Control (DQC) Team**

DQC is the review of basic science and engineering work products focusing on ensuring the quality and credibility of the government's scientific and budgetary information. It is managed in the district doing the design in accordance with MVD and MVP Quality Management Standards (see USACE QMS Portal) and may be conducted by staff in the home district or by contracted AE firms as long as they are not involved in the design.

DQC is required for all work products, reports, evaluations, and assessments. Quality control will also be monitored via local reviews, and Corps-led Higher Authority/vertical team conferences and reviews. The vertical team will be involved in the E&D review process and will be presented with information during the standard Corps checkpoints.

In-kind deliverables are anticipated to be critical to the success of this project as part of the non-federal cost share. The sponsor will be responsible for quality control over deliverables provided as in-kind contributions. The Corps will verify that such contributions meet negotiated requirements and standards before granting cost-sharing credit for those contributions.

## **6.3 Agency Technical Review (ATR) Team**

An ATR is an in-depth review undertaken to ensure the quality and credibility of the government's scientific information, managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the project/product. The purpose of ATR is to ensure proper application of clearly established criteria, regulations, laws, codes, principles and professional practices.

The ATR teams are comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team is selected from outside the Mississippi Valley Division. [NOTE: During the feasibility phase, the ATR lead (Mark Nelson) and several of the ATR Team Members were from the Omaha District; to ensure consistency, it is recommended that the ATR Team from the feasibility phase continue to be engaged in the ATR efforts for the engineering and design phase.]

The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole. The ATR teams will be provided draft and intermediate versions of documents so that team can become familiar with reach/element documents and provide "critical" comments, but that the overall ATR is on final products (H&H, Geotech, FTR version of P&S).

ATR is designed to be a relatively continuous process with reviews synchronized with the PDT's production of products and supporting analyses. Given the scale and phased nature of the design of the project, the timing of ATR activities will be dependent on the design schedule and coordinated with certain milestones of draft and final documents. The purpose of the ATR, broadly, is to:

- Ensure the quality and credibility of the government's scientific information;
- Ensure that the appropriate problems and opportunities are addressed;
- Confirm that appropriate solutions are considered;
- Assure that accurate cost, scheduling and associated risks are presented;
- Confirm that the recommended solution is in accord with current policies;
- Confirm that the design can be implemented in accordance with environmental laws and statutes.

The ATR will be on-going throughout product development, rather than a cumulative review performed at the end of the design, and will build upon any and all prior cycles of review. The ATR will be performed by designated ATR Team in coordination with the Risk Management Center. This will ensure that a review team with appropriate independence and expertise is assembled and a cohesive and comprehensive review is accomplished. A separate ATR will be performed on each distinct element of the project, including but not limited to, the individual reaches of the diversion, each hydraulic structure, applicable bridges, environmental mitigation and recreation design; this includes sponsor work in-kind elements.

Table 1 lists the various technical disciplines that are anticipated for various ATR reviews. For each specific sub-project, the disciplines required and the names of ATR members will be identified at the time the Reach Management Plan is prepared for the sub-project.

Table 1 – ATR Disciplines Anticipated for the Project

Recreation/Planning  
Environmental/NEPA/Cultural  
Cost/Value Engineering  
Hydrology and Hydraulics Engineering  
Geotechnical Engineering  
Civil Engineering and Landscape Design  
Structural Engineering  
Mechanical Engineering  
Electrical Engineering  
CAD and Specifications  
Real Estate  
Construction

Specialized experience for each of the disciplines is summarized below:

**Recreation/Planning:**

The local sponsor is conducting recreation planning during E&D phase. The recreation planner will review the recreation plan developed during the E&D phase. This will include review of recreational costs, unit day values, the proposed features and anticipated uses.

**Environmental/NEPA/Cultural:**

The Environmental reviewer will be responsible for reviewing ecosystem restoration and mitigation plans and specs and ensuring the proper NEPA and cultural resource compliance activities were completed.

**Cost/Value Engineer:**

The cost reviewer will ensure that the estimated project costs are accurate and that the assumptions made to develop these costs were reasonable.

**Hydraulics and Hydrology Engineering:**

The Hydraulics and Hydrology reviewer will ensure that the hydrologic and hydraulic analysis was properly completed and that the alternatives will achieve the desired flood stage in the benefitted area.

**Geotechnical Engineering:**

The reviewers will ensure that the designed project meets Corps standards, the design assumptions are reasonable, and the geotechnical analyzes are complete.

**Civil Engineering and Landscape Design:**

The reviewers will ensure that the designed project meets Corps standards, the design analyzes are complete, and the estimated quantities are reasonable. This applies to the civil-site features, utility features, and landscape architecture features.

**Structural/Mechanical/Electrical Engineering:**

The reviewers will ensure that the designed project meets Corps standards, the design analyzes are complete, and the estimated quantities are reasonable. This applies to the structural features, electrical features, and mechanical features.

**CAD Standards and Specifications:**

The CAD Standards and Specifications reviewers will ensure that appropriate USACE standards were utilized.

**Real Estate:**

The Real Estate reviewer will ensure that all of the lands necessary for the project are accounted for and that the estimated costs to acquire the property rights to those lands are accurate.

**Construction:**

The reviewers will determine the constructability of the product and methods of construction for schedule creation, phasing, sequencing of activities. Construction will also address any safety issues that may arise during construction and the design and construction of any temporary roads or other measures that may be required or should be incorporated in the design documents.

ATR will be conducted on all Corps' responsible project components and non-federal sponsors work in-kind (WIK) project components to include, but not limited to, the structures on the rivers (Rush, Lower Rush, Maple, Sheyenne, Wild Rice, and Red) and the diversion channel. If the ATR team requires charge questions, they will be developed by the PDT. The ATR team will work together to ensure that ATR criteria are met. The criteria as stated in EC 1165-2-209 are as follows:

- Products will be reviewed against published guidance, including Engineering Regulations, Engineering Circulars, Engineering Manuals, Engineering Technical Letters, Engineering Construction Bulletins, Policy Guidance Letters, implementation guidance, project guidance memoranda, and other formal guidance memoranda issued by HQUSACE. Any justified and approved waivers should have been obtained from HQUSACE for any deviations from USACE guidance;
- The project meets the customer's scope, intent and quality objectives as defined in the PMP;
- Concepts and project costs are valid;
- The non-Federal sponsor is aware of its requirements and concurs with the proposed recommendations;
- The design is feasible and will be safe, functional, constructible, environmentally sustainable, within the Federal interest, and economically justified according to policy;
- All relevant engineering and scientific disciplines have been effectively integrated;
- Appropriate computer models and methods of analysis were used and basic assumptions are valid and used for the intended purpose;
- The source, amount, and level of detail of the data used in the analysis are appropriate for the complexity of the project;
- The project complies with accepted practice within USACE;
- Content is sufficiently complete for the current phase of the project and provides an adequate basis for future development effort;
- Project documentation is appropriate and adequate for the project phase.

## **6.4 Independent External Peer Review (IEPR) Type II Safety Assurance Review (SAR) Team**

This project will be subject to IEPR guidelines in accordance with EC 1165-2-209 on the basis of project cost. The project is estimated to cost \$1.77 billion. For Safety Assurance Reviews, the IEPR review panel members must be made up of independent, recognized experts from outside the USACE in the appropriate disciplines, representing a balance of expertise suitable for the review being conducted.

The composition of the IEPR SAR Team and detailed requirements for the execution of the IEPR SAR efforts are defined in the IEPR SOW (see Attachment 5). [NOTE: At the time this Review Plans and the attached IEPR SOW were prepared, the project has not yet been authorized for construction. Once authorization for construction is received, either the IEPR SOW will be revised/updated or a new IEPR SOW will be prepared for the engineering during construction phase of the project. The intention will be that the IEPR Team for engineering and design phase will be also engage during the construction phase.]

IEPR is applied in cases that meet certain criteria where the risk and magnitude of the proposed projects are such that a critical examination by a qualified team outside of USACE is warranted. The general purpose of the IEPR is to consider the adequacy, appropriateness, and acceptability of the design in assuring public health, safety, and welfare. The IEPR will be a larger-scale, holistic review that encompasses the breadth of the project from start to finish. In contrast to the element-focused ATR, the IEPR will look for project-wide consistency and quality across the various elements and designers. The IEPR will include design and construction of the elements of the project, but also inter-element considerations such as the interface between reaches and bridges or reaches and structures. The IEPR will consider life-cycle issues such as the ease and means of future expansion of the channel and structures, long-term maintenance issues, and access to structures for maintenance. Finally, the IEPR will ensure consistency in design standards between Corps designers, local sponsor AE firms, or Corps-contracted AE firms.

The IEPR SAR will address the underlying planning, engineering, safety assurance, economics, and environmental analyses performed, not just one aspect of the project. A SAR is required for any project where potential hazards pose a significant threat the human life. This includes all projects involving levees or dams. The PDT, in coordination with the RMC, will develop the charge questions for the IEPR. Specifically, the reviewers will be given a Charge that includes the following:

- Reviews should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. A review panel should bring important issues to the attention of the agency. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. However, review panels should be instructed to not present a final judgment on whether a project should be constructed or whether a particular operations plan should be implemented, as the Chief of Engineers is ultimately responsible for this final decision.
- Peer reviews, no matter how useful, should not be expected to resolve fundamental disagreements and controversies. Reviewers should aim to draw distinctions between

criticisms of the regulations and guidelines and criticisms of how well USACE conformed to the guidance. Reviews should focus on assumptions, data, methods, and models.

- Reviews will assist USACE in making decisions, but reviewers should not be asked to make decisions. Reviewers should avoid findings that become “directives” in that they call for modifications or additional studies or suggest new conclusions and recommendations. Reviewers engaged in the review processes should be selected based upon their independence and professional expertise and should not be “stakeholders”.
- Review panels should highlight areas of disagreement and controversies that may need resolution.

The review will consist of specific items as designated by the project manager and Review Management Office. In general, the reviewers will be required to:

- Focus on unique features and changes from the assumptions made and conditions that formed the basis for the design during the decision document phase.
- Evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable.
- Offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.
- For the E&D phase – focus on unique features and changes from the assumptions made and conditions that formed the basis for the design during the decision document phase. Address the following questions:
  - Do the assumptions made during the decision document phase for hazards remain valid through the completion of design as additional knowledge is gained and the state-of-the-art evolves?
  - Do the project features adequately address redundancy, resiliency, or robustness with an emphasis on interfaces between structures, materials, members, and project phases?
  - Do the project features and/or components effectively work as a system?

The Project Management Plan (PMP), of which this review plan is a component, for the E&D phase currently includes \$11,900,000 for IEPR activities and assumes the use of relatively straight forward construction measures and design of complicated river and tributary structures. If the scope of the project increases significantly or novel solutions are proposed, the composition of the IEPR panel and the review cost estimate will be adjusted accordingly.

## 6.5 Methodology and Model Certification

EC 1165-2-209 requires certification (for Corps models) or approval (for non-Corps models) of planning models used for all planning activities. Since this project is not in the planning phase, model review and certification are not required.

Even though model review and certification are not required since the project is now in the implementation phase of design development, the responsible use of well-known and proven USACE

developed and commercial engineering software will continue and will follow the professional practice of documenting the application of the software and modeling results. The technical models that have been used on the design of this project are listed below:

- Hydraulics and Hydrology: HEC-RAS and HEC-HMS
- Geotechnical: GeoStudio 2007, Seepw/W, and Slope/W
- Cost Engineering: MCASES

### 6.6 Policy Compliance / Legal Review Team

The St. Paul District Office of Counsel is responsible for legal review of decision and implementation documents and signs a certification of legal sufficiency prior to construction of the project.

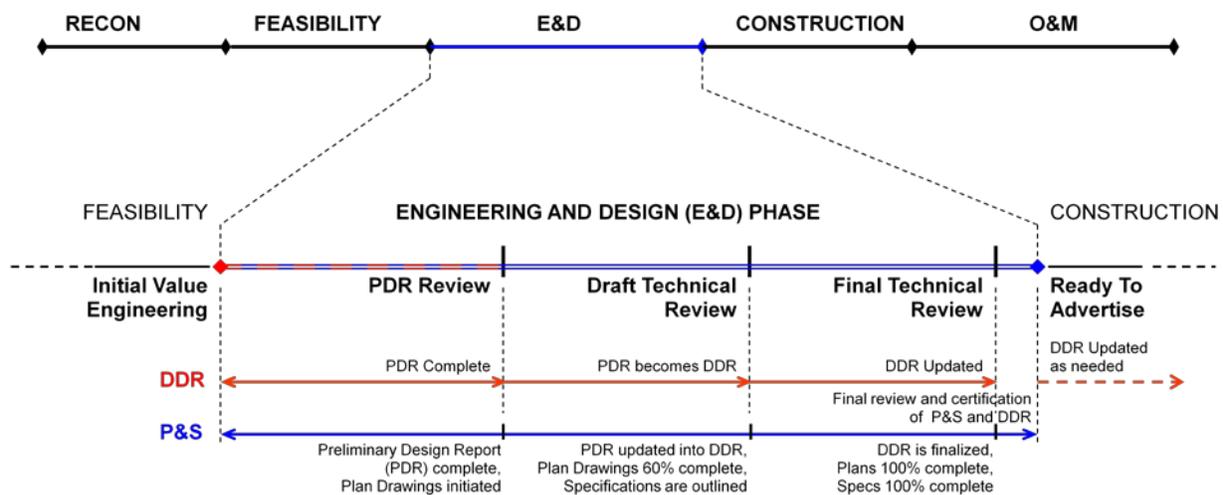
### 6.7 Sponsor Review Team

Cities of Fargo and Moorhead, being the local sponsors on the project, are required to participate during each design. The sponsors will receive copies of each major design revision and review comments and responses, and attend progress meetings during the design process.

## 7 Products to be Reviewed

The products developed during the E&D Phase covered by this RP will result in the preparation of the Solicitation Documents [aka Plans and Specifications (P&S)] for the construction of this project reach/feature. Coincidentally with the preparation of the Solicitation Documents, the Design Documentation Report (DDR) for this project reach/feature will also be developed. **Figure 7** illustrates the major review points during the E&D Phase for a typical reach/feature. The actual number and timing (e.g. 355, 65%, 95%, etc) for each particular sub-project will be determine on a case-by-case basis for each reach/feature.

**FIGURE 7: TYPICAL REVIEWS DURING THE E&D PHASE**



In general, the PDTs for each sub-project will deliver a Preliminary Engineering Report (PER), Real Estate drawings, Plans and Specifications (P&S), a Cost Estimate, and a final Design Documentation Report (DDR). The following sections describe each product that will be delivered by the PDT, and the expectations of each product at the appropriate review stage.

## **7.1 Initial Value Engineering Study**

Prior to the onset of design efforts for a particular project reach/feature, a Value-Based Design Charrette (VBDC) will be conducted. The outcomes of the VBDC will be documented in a report. The VBDC Report will be presented to the PDT and other interested parties for review and comment. The finalized VBDC Report will become the basis for the initiation of the design phase for this reach/feature.

## **7.2 Preliminary Engineering Report (PER)**

### **7.2.1 Purpose**

A review of the PER is primarily to insure that the critical design parameters are fully established and that project features are fully formulated so that the preparation of Solicitation Documents and the DDR can begin. The PER will undergo DQC, ATR, and IEPR reviews.

### **7.2.2 Content and Level of Detail**

The purpose of the PER is to gather sufficient information and perform adequate analysis to determine the size, siting, and configuration of the features being designed. The PER will be incorporated into the Design Documentation Report (DDR) during the development of the Solicitation Documents. The PER will contain information from all disciplines included in the development of plans and specifications for the project element. Sufficient information will be provided in the PER to determine the size and configuration of all features being designed. Additionally, all disciplines will provide design information required by other disciplines with the intent of minimizing redesign work. A list of examples is included below; this list is not intended to be all inclusive:

- Hydraulic information will be sufficient to locate and size the project elements and perform required geotechnical analysis
- Geotechnical exploration will be complete, and geotechnical analysis will be sufficient to provide other disciplines appropriate geotechnical parameter
- Environmental design parameters and assumptions will be developed to design the appropriate project elements.
- Information will be gathered to initiate the development of spoil sites, real-estate, utility plans, civil plans, recreational features, access roads, etc.
- Preliminary site layout plans will be developed to show the alignment and the location of known features.
- Preliminary structural design will be complete included preliminary drawings showing the primary structural features.

### **7.2.3 Report Format**

Because the PER will be incorporated into the DDR during P&S, the PER will be formatted such that the DDR can be developed by expanding upon the information in the PER. The PER should include the following information; this list is not intended to be all inclusive:

- Project Description
- Project Reference Data
- Design Description and Criteria
- Assumptions, Constraints, Risks
- Design Methodology
- Outstanding Issues
- Further design tasks

## **7.3 Solicitation Documents, DDR, and Other E&D Products**

There will be two technical reviews and a final certification review as defined in the following paragraphs.

### **7.3.1 Draft Technical Review (DTR)**

#### **7.3.1.1 Purpose**

The Draft Technical Review (DTR) is to ensure that the drawings, specifications, design analysis, and cost estimate are proceeding in a timely manner, that the design criteria and previous review comments are being correctly interpreted, and that funding constraints are being met.

#### **7.3.1.2 Content and Level of Detail**

The DTR products consist of:

- 1) Design Documentation Report (updated to this point in time);
- 2) Drawing set including the drawings that address construction phasing (approximately 50 to 65% complete);
- 3) Specifications (all technical sections developed to approximately 50% completion; identify Bid Options where applicable);
- 4) Quantities of materials;
- 5) Current Working Estimate (CWE) and Construction Schedule;
- 6) Real Estate drawings (approximately 75% complete);
- 7) Engineering Considerations for Construction (initial draft); and
- 8) DrChecks Report from previous reviews (comments, responses, and backchecks).

## **7.3.2 Final Technical Review (FTR)**

### **7.3.2.1 Purpose**

The Final Technical Review (FTR) is to ensure that the drawings, specifications, design analysis, and cost estimate are essentially complete, that the design criteria and previous review comments are being correctly interpreted, and that funding constraints are being met. The products at this point represent a 100% complete design with the exception of the incorporation of any review comments resulting from the review of the submittal.

### **7.3.2.2 Content and Level of Detail**

The FTR products consist of:

- 1) Design Documentation Report with all items 100% complete. It shall include all backup material previously submitted and revised as necessary, all design calculations, all explanatory material giving the design rationale for any design decisions which would not be obvious to an engineer reviewing the Final drawings and specifications, and complete notations for Construction Manager;
- 2) Drawing set including the drawings that address construction phasing (95% complete);
- 3) Specifications (final edited technical specifications as well as the contract front-end);
- 4) Bidding Schedule and an Explanation of Bid Items (identify Bid Options where applicable);
- 5) Quantities of materials;
- 6) Current Working Estimate (CWE) and Construction Schedule;
- 7) All supporting documentation required for permit application approvals;
- 8) Real Estate drawings, 100% complete;
- 9) Engineering Considerations for Construction (pre-final version);
- 10) DrChecks Report from previous review (comments, responses, and backchecks).

## **7.3.3 Final BCOE Review and Certification of Ready-to-Advertise**

### **7.3.3.1 Purpose**

The Bidability, Constructability, Operability, and Environmental (BCOE) Review is to ensure that the drawings, specifications, design analysis cost estimate, and environmental permitting are totally complete. The products at this point represent a 100% complete design including the complete incorporation of all review comments resulting from the review of the Final P&S submittal.

### **7.3.3.2 Content and Level of Detail**

The BCOE products consist of:

- 1) Design Documentation Report (all items 100% complete);
- 2) Drawing set (100% complete);

- 3) Specifications and Contract Clauses (100% complete);
- 4) Engineering Considerations for Construction;
- 5) DrChecks Report from previous review (comments, responses, and backchecks).

## **8 Method of Providing Review Comments**

### **8.1 District Quality Control (DQC)**

The DQC Reviewers shall follow the guidance outlined in **Attachment 4 – Guidance for Reviews** in deciding which comments should be conveyed via formal and informal methods. Upon the close of a review period, the appropriate parties within the PDT will be expected to promptly evaluate/respond to the formal comments placed into the DrChecks review. Reviewers will then backcheck all comments before the review is considered “closed”.

Reviewers shall use DQC Checklists such as the ones provided in MVD and MVP Quality Management Standards (see USACE QMS Portal) and attach the completed checklist to a comment in DRChecks. The Reviewer may tailor/revise the sample checklists to suit the particular review.

Upon receipt of the DQC comment memorandum, the PDT will develop responses to the specific concerns and coordinate those responses. The DQC documentation in DrChecks will include the text of each DQC concern, the design team response, a brief summary of the pertinent points in any ensuing discussion, including any vertical coordination, and lastly the agreed upon resolution. Documentation of the DQC will be included with the submission of the reports to MVD and HQUSACE. All comments resulting from the DQC will be resolved prior to advertising, bidding, or completion of the design process. The report will be accompanied by a certification, indicating that the DQC process has been completed and that all technical issues have been resolved.

### **8.2 Agency Technical Review (ATR)**

#### **8.2.1 Documentation of ATR**

ATR comments and responses will be recorded in the DRChecks portion of the ProjNet System ([www.projnet.org](http://www.projnet.org)). Upon receipt of the ATR comment memorandum, the PDT will develop responses to the specific concerns and coordinate those responses with the ATR team through MVD. The ATR documentation in DrChecks will include the text of each ATR concern, the design team response, a brief summary of the pertinent points in any ensuing discussion, including any vertical coordination, and lastly the agreed upon resolution. Documentation of the ATR will be included with the submission of the reports to MVD and HQUSACE. All comments resulting from the ATR will be resolved prior to advertising, bidding, or completion of the design process. The report will be accompanied by a certification, indicating that the ATR process has been completed and that all technical issues have been resolved.

ATR reviewers, especially during the earlier technical reviews, oftentimes find many items/issues in the products that are not critical per the scope/intent of an ATR. ATR Reviewers shall use the guidance

outlined in **Attachment 4 – Guidance for Reviews** in deciding which comments should be conveyed via formal and informal methods.

Comments should be limited to those that are required to ensure adequacy of the product, and consistent with the design standards in the PMP. The comments should not include personal preference, alternative ways to complete analysis, or other items that are “nice” to do unless they are indirect violation of Corps policy. The four key parts of a quality review comment normally include:

- The review concern – identify the product's information deficiency or incorrect application of policy, guidance, or procedures;
- The basis for the concern – cite the appropriate law, ASA (CW)/USACE policy, guidance or procedure that has not been properly followed;
- The probable specific action needed to resolve the concern – identify the action(s) that must be taken to resolve the concern.
- ATR comments should not include:
  - Attempts to enforce personal preferences over otherwise acceptable practices, i.e., alternate solutions or analysis methods when the practitioners have already used appropriate methods to develop an adequate solution;
  - Any other issues that do not add value towards the implementation decisions and recommendations, or do not make the design safe, functional, or more economical.

### 8.2.2 ATR Issues

In some situations, especially addressing incomplete or unclear information, comments may seek clarification or try to assess whether further specific concerns may exist. The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical coordination, and lastly the agreed upon resolution. The ATR team will prepare a Review Report which includes a summary of each unresolved issue; each unresolved issue will be raised to the Chief of Engineering-Construction for resolution. Review Reports are considered an integral part of the ATR documentation and will:

- Include the charge to the reviewers;
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

### 8.2.3 ATR Completion

ATR is considered complete and certified when all ATR concerns are either resolved or referred to the District's Chief of Engineering Division for resolution and the ATR documentation is complete. A sample ATR certification is included as **Attachment 3 – Sample ATR Certification Statement**.

## 8.3 Independent External Peer Review (IEPR)

IEPR comments and responses will be recorded in the DRChecks portion of the ProjNet System ([www.projnet.org](http://www.projnet.org)).

- The review team will prepare a review report. All review panel comments shall be entered as team comments that represent the group and be non-attributable to individuals. The team lead is to seek consensus, but where there is a lack of consensus, note the non-concurrence and why. A suggested report outline is:
  1. Introduction
  2. Composition of the review team
  3. Summary of the review during design
  4. Lessons learned in both the process and/or design
  5. Appendices for conflict of disclosure forms
  6. Appendices including any analyses or assessments of the adequacy and acceptability of the methods, models, and analyses used.
- All comments in the report will be finalized by the panel prior to their release to USACE for each review plan milestone.
- After receiving a report on a project from the peer review panel, the District Chief of Engineering, with full coordination with the Chiefs of Construction and Operations, shall consider all comments contained in the report and prepare a written response for all comments and note concurrence and subsequent action or non-concurrence with an explanation. The District Chief of Engineering shall submit the panel's report and the District's responses shall be submitted to MVD for the MVD Commander's approval. The SAR/IEPR Review Report, USACE responses, and all other material related to the IEPR will be made available to the public on the District's website.

The project may generate some controversy similar to other larger flood risk management plans, but the public and many state and Federal agencies are expected to support the project and will participate in the project development. The plan is not anticipated to disseminate influential scientific information or scientific assessment. The IEPR report and responses to the IEPR will be posted on the St. Paul District website and distributed as hard copies upon request.

## 9 Review Schedule and Review Costs

Since this project is comprised of many sub-projects (reaches/features) that have products that will require reviews, as well as products that apply across the board to the overall project that will require review, the schedules and costs for all such reviews will not be defined in this Review Plan. As stated previously, sub-project specific Review Plans that define the review team members, the review schedule, and the anticipated costs will be developed at the onset of E&D for each sub-project.

To assist the reviewers of this Review Plan understand the scope/extent of products that will require review, **Attachment 1 – Schedule of Products for Review** contains a listing of the major products to be reviewed during the E&D phase. This Attachment will be regularly updated annually or as this Review Plan is revised/updated.

### 9.1 DQC and BCOE Schedules and Costs

The DQC, which includes PER Review, Draft Technical Review (DTR), and Final Technical Review (FTR), as well as the final Bidability, Constructability, Operability, and Environmental (BCOE) Review, will be completed per schedules developed for each sub-project; see **Attachment 1** for an approximate schedule of reviews during the foreseeable future (FY 12 and F13).

Each of these reviews will typically have 10 to 12 reviewers and will typically take 5 days at \$1000/day to accomplish. NOTE: The 5 days included 3 days for actual review, 1 day for entering and discussing comments, and 1 day for backchecking comments. Not included in this time is that for the designer(s) to evaluate the comments and make changes/corrections that result from the comments.

Thus, the typical DQC/BCOE cost per sub-project is estimated to be:

Discipline	Estimated Labor Cost
DQC Lead Engineer	4 Reviews @ \$6,000/review = \$24,000
Supporting Disciplines	10 Disciplines @ 4 Reviews @ \$5000/review = \$200,000
TOTAL DQC/BCOE Cost per FMM Sub-Project	\$224,000

During the course of FY12 and FY13, it is anticipated that that nine (9) sub-projects in the design phase of development. Thus the total approximate cost of DQC/BCOE efforts for these two fiscal years is anticipated to be approximately  $9 \times \$224,000 = \$2,016,000$ .

### 9.2 ATR Schedule and Cost

The ATRs will be completed per schedules developed for each sub-project; see Attachment 1 for an approximate schedule of reviews during the foreseeable future (FY 12 and F13). The submission of products for ATR reviews will follow the comment submission and comment evaluation from the DQC reviews. The typical time frame for each ATR is one to two weeks for comments, one week for responses, and if necessary a meeting to discuss the comments and responses from DrChecks, and a week to backcheck the documents. NOTE: Although multiple weeks are allowed in the schedule to

accomplish each review, as stated below, it is assumed that the actual time chargeable to the each review is approximately 5 days per reviewer.

Following is a typical schedule for an ATR review of each sub-project:

- Value-Based Design Charrette (VBDC) Report and “Charge” sent to ATR Team
- Initiate Review of Preliminary Design Report
- Initiate Draft Technical Design Review
- Initiate Final Technical Design Review
- ATR backchecks complete; DrChecks closed
- ATR certification form signed
- ATR final report complete
- Report sent to District’s Chief of Engineering-Construction Division for approval

Each of these reviews will typically have 10 to 12 reviewers and will typically take 5 days at \$1000/day to accomplish. NOTE: The 5 days included 3 days for actual review, 1 day for entering and discussing comments, and 1 day for backchecking comments. Not included in this time is that for the designer(s) to evaluate the comments and make changes/corrections that result from the comments.

Thus, the typical ATR cost per sub-project is estimated to be:

<b>Discipline</b>	<b>Estimated Labor Cost per FMM Sub-Project</b>
ATR Leader	4 Reviews @ \$7,000/review = \$28,000
Supporting Disciplines	10 Disciplines @ 4 Reviews @ \$5000/review = \$200,000
TOTAL ATR Cost per FMM Sub-Project	\$228,000

During the course of FY12 and FY13, it is anticipated that that nine (9) sub-projects in the design phase of development. Thus the total approximate cost of ATR efforts for these two fiscal years is anticipated to be approximately  $9 \times \$228,000 = \$2,052,000$ .

### **9.3 IEPR Schedule and Cost**

See Attachment 5: SOW for Type II IEPR SAR Review for the anticipated review schedule and estimate cost of reviews.

## **10 Posting of Review Plans and Public Comment**

Since this Review Plan is for implementation documents for the construction stage of the project, the Review Plan will not be posted to the internet under the District’s “Review Plan” hyperlink, and thus there will not be public comment capability.

This Review Plan, along with the overall Project Management Plan, the Reach Management Plans, the master spreadsheet of DQC, ATR, and IEPR reviews, and all other quality assurance documents will be kept up-to-date on the FMM Extranet site at

<https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/default.aspx>

## 11 Primary Points of Contact for this Review Plan

### 11.1 Review Management Organization POCs

Risk Management Center (RMC)	Primary	Colin Krumdieck	303-963-4541
	Alternate	Bill Empson	913-787-5356

### 11.2 MSC Organization POCs

Mississippi Valley Division (MVD)	Div Levee Safety Program Manager	Pete Montalbano	601-634-7162
	Division Program Manager	Elizabeth Ivy	601-634-5310

### 11.3 District Quality Control POCs

St. Paul District – Chief of Engineering-Construction Division	Michael Bart	651-290-5303
St. Paul District – Quality and Review Manager	James Mosner	651-290-5512

## 12 History of Review Plan Updates

Version	Description & Location Within PMP of Revision	Approval Date	Approved By
Original RMP	Initially approved version		
Revision # ____			

### 13 Attachments

No.	Title / Description
1	Schedule of Products for Reviews
2	Listing of DQC, BCOE, ATR, IEPR Reviewers
3	Sample ATR Certification Statement
4	Guidance for Reviews
5	SOW for Type II IEPR SAR Review (separate document, attached by reference)
	Review Plan Checklist (separate document, not attached hereto)

## Attachment 1: Schedule of Products for Reviews

Due to the long time duration of this project, the many sub-projects that comprise the overall project, and the dynamic nature of how this project will evolve, an up-to-date listing of DQC, BCOE, ATR, and IEPR reviews will be maintained on the FMM Extranet site, see

[<https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/Shared%20Documents/Forms/SharePoint%20View.aspx?RootFolder=%2fsites%2fDivisions%2fMVD%2fMVP%2fFargoMoorhead%2fShared%20Documents%2f01%5fProject%5fManagement%5fPlan%5fand%5fAppendices%2fProject%20Schedules&FolderCTID=&View=%7bE3D1FC1C%2d2F9B%2d4D18%2dA012%2d6B37CB9D928A%7d>].

Following is a listing of the key actions/activities in implementing the Review Plan

<b><u>ACTIVITIES in the REVIEW PLAN APPROVAL PROCESS</u></b>	<b><u>TIME FRAME</u></b>
Submit Draft Review Plan to RMC for Review and Comments	31 Jan 2012
Submit Final Review Plan to RMC for Endorsement	30 Apr 2012
Submit Final Review Plan to MVD for Approval	3 <sup>rd</sup> Qtr FY12
RMC Selects/Approves the ATR Team	3 <sup>rd</sup> Qtr FY12
RMC Selects/Approves the Type II IEPR SAR Team	3 <sup>rd</sup> Qtr FY12

The following pages contain a static listing of the sub-projects that P&S packages that will be developed over the next few fiscal years, along with the anticipated fiscal year quarter that a review of the associated review packages will be accomplished. This listing of sub-projects and reviews will be updated annually or as this Review Plan is revised/updated. As stated in the first paragraph above, a dynamic, up-to-date overall schedule will be maintained on the FMM Extranet site.

**Schedule of Products for Reviews**

Reach	FY12				FY13				Future FYs
	Review	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	
Overall DDR	DQC/ATR/IEPR		Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Reach 1					Produced by MVP; thorough IEPR req'd				
PER	DQC/ATR/IEPR								
DTR			DQC/ATR/IEPR						
FTR				DQC/ATR/IEPR					
Final					DQC/ATR/IEPR				
Reach 2					Produced by MVR; only overview IEPR				
PER			DQC/ATR/IEPR						
DTR				DQC/ATR/IEPR					
FTR					DQC/ATR/IEPR				
Final					DQC/ATR/IEPR				
Reach 3					Produced by WIK; only overview IEPR				
PER			DQC/ATR/IEPR						
DTR				DQC/ATR/IEPR					
FTR					DQC/ATR/IEPR				
Final					DQC/ATR/IEPR				
Reach 4					Produced by MVK & MVS; only overview IEPR				
PER				DQC/ATR/IEPR					
DTR					DQC/ATR/IEPR				
FTR					DQC/ATR/IEPR				
Final					DQC/ATR/IEPR				
Reach 5					Produced by MVM & MVS; only overview IEPR				
PER				DQC/ATR/IEPR					
DTR					DQC/ATR/IEPR				
FTR					DQC/ATR/IEPR				
Final					DQC/ATR/IEPR				
Reach 6					Produced by WIK; only overview IEPR				
PER			DQC/ATR/IEPR						
DTR				DQC/ATR/IEPR					
FTR					DQC/ATR/IEPR				
Final					DQC/ATR/IEPR				
Reach 7 and Maple River Aqueduct					Produced by MVR; thorough IEPR req'd for Aqueduct				
PER					DQC/ATR/IEPR				
DTR					DQC/ATR/IEPR				
FTR					DQC/ATR/IEPR				
Final							DQC/ATR/IEPR		

Reach	Review	FY12				FY13				Future FYs
		1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	
Multiple Reaches Upstream of Reach 7										
	PER									X
	DTR									X
	FTR									X
	Final									X
Sheyenne River Aqueduct										
	PER									X
	DTR									X
	FTR									X
	Final									X
Mitigation 1 – Drayton Dam <span style="float: right;">Produced by MVP; only overview IEPR</span>										
	PER		DQC/ATR/IEPR							
	DTR		DQC/ATR/IEPR							
	FTR		DQC/ATR/IEPR							
	Final		DQC/ATR/IEPR							
Mitigation 2 – Wild Rice Dam <span style="float: right;">Produced by MVP; only overview IEPR</span>										
	PER		DQC/ATR/IEPR							
	DTR		DQC/ATR/IEPR							
	FTR		DQC/ATR/IEPR							
	Final		DQC/ATR/IEPR							
Levees/Floodwalls Thru Town										
	PER									X
	DTR									X
	FTR									X
	Final									X
Wild Rice River Structure										
	PER									X
	DTR									X
	FTR									X
	Final									X
Red River Structure										
	PER									X
	DTR									X
	FTR									X
	Final									X

Reach		FY12				FY13				Future FYs
Review	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr		
Upstream Tie-Back Levees										
PER										X
DTR										X
FTR										X
Final										X
Upstream Storage										
PER										X
DTR										X
FTR										X
Final										X

## **Attachment 2: Listing of DQC, BCOE, ATR, IEPR Reviewers**

Due to the long time duration of this project, the many sub-projects that comprise the overall project, and the dynamic nature of how this project will evolve rather than including a static listing of reviewers for each of the different types of reviews, an up-to-date listing of DQC, BCOE, ATR, and IEPR reviewers that are assigned to each sub-project will be maintained on an Excel spreadsheet on the FMM Extranet site, see

[[https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/Shared%20Documents/01\\_Project\\_Management\\_Plan\\_and\\_Appendices/Review\\_Management\\_and\\_QA-QC\\_Info/FMM\\_Review\\_Teams\\_Matrix.xlsx](https://extranet.dse.usace.army.mil/sites/Divisions/MVD/MVP/FargoMoorhead/Shared%20Documents/01_Project_Management_Plan_and_Appendices/Review_Management_and_QA-QC_Info/FMM_Review_Teams_Matrix.xlsx)]. Each of the major categories of reviews will be on a separate tab on the spreadsheet.



### Attachment 3: Sample ATR Certification Statement

The Agency Technical Review (ATR) has been completed for the St. Croix Falls Waterwater Treatment Plant located at St. Croix Falls, WI. The ATR was conducted as defined in the project’s Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer’s needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks<sup>sm</sup>.

\_\_\_\_\_  
Xxxxx Xxxxx  
ATR Team Leader  
CELRC-TS-C-R

\_\_\_\_\_  
Date

\_\_\_\_\_  
Xxxxx Xxxxx  
Project Manager  
CEMVP-PM

\_\_\_\_\_  
Date

\_\_\_\_\_  
Nathan Snorteland  
Review Management Office Representative  
Director, Risk Management Center

\_\_\_\_\_  
Date

#### CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: [Describe the major technical concerns and their resolution]

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

\_\_\_\_\_  
**Michael J. Bart**  
Chief, Engineering Division  
CEMVP-EC

\_\_\_\_\_  
Date

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## Attachment 4: Guidance for Reviews

### 1. General Guidance for PDT Members, DQC Reviewers, and ATR Reviewers

In performing reviews of technical products, it is requested that you rationalize your comments as being either formal comments or informal comments, and that you use the appropriate tools/methods, as described below, for documenting and transmitting your comments.

**Formal comments** are those that will likely affect or impact: 1) a project's budget and/or schedule, 2) safety and/or security, or 3) conflict with laws, policy, and/or guidance. These types of comments shall be entered into DRCheckS<sup>®</sup>, which is the mandated system for submitting, tracking, and responding to comments on engineering and design products.

**Informal comments**, oftentimes considered to be courtesy comments, are those such as grammatical, editorial, and non-critical comments intended to alert the designer to items or issues that they may want to consider further. These types of comments can be passed along to the designer(s) by way of marked-up (aka red-lined) documents. A tool that is very handy to use for this purpose is the Comment and Markup feature in Adobe Reader/Acrobat, which is described in more detail in a later paragraph.

For both categories of comments, it is requested that Reviewers refrain from personal preference type comments unless there is a very strong basis for making the suggestion; in which case the rationale should clearly be stated. For instance if there is another way to do an analysis, but the way chosen by the PDT member is consistent with Corps guidance and best practices, then this can be provided informally for consideration but should not be a formal comment.

The ATR and DQC reviews are not intended to bring up other alternatives or other measures for consideration, they are to be focused only on the package presented to ensure that is compliant with Corps guidance and that there are no "red flag" issues that could cause project failure.

#### 1.1 Policy

Policy guidance and objectives of design/technical reviews are defined in:

ER 1110-1-12	Quality Management
ER 1110-1-8159	Engineering and Design, DRCheckS <sup>®</sup>
ER 1110-2-1150	Engineering and Design for Civil Works Projects

#### 1.2 Formal Comments

As stated above, DRCheckS<sup>®</sup>, which is available on <https://www.projnet.org/projnet/>, should be used for formal review comments and comment closure in accordance with ER 1110-1-8159. All major issue comments that require full and formal closure must be put into DRCheckS<sup>®</sup>. Reviewers are strongly

encouraged to contact Project Delivery Team (PDT) members directly to clarify any confusion before making a review comment. Formal review comments should contain these principal elements, known as the four part comment:

- A clear statement of the concern
- The basis for the concern, such as law, policy, or guidance
- Significance of the concern
- Specific actions needed to resolve the comment

Reviewers are also strongly encouraged to only include one (1) issue/item per each DRCheckS<sup>®</sup> comment. When more than one issue/item is included per comment, the comment Evaluators may not be able to properly/satisfactorily address multi-part comments. Hence, the comment Backcheckers may not be able to close a comment.

If the four part comment is not being followed ATR reviewers may be asked to go back and ensure that this process is being followed.

### **1.3 Informal Comments**

For informal review comments on documents that are furnished in PDF format, Reviewers are strongly encouraged to use the “Comment and Markup” feature that is part of current Adobe Reader / Adobe Acrobat programs. Adobe’s Comment and Markup feature allows reviewers to capture and record informal comments, such as editorial comments, suggestions, and questions. In addition, designers can respond to comments and closeout comments. At the end of a review the Project Manager can generate a report that indicates for each comment whether it was “cancelled”, “accepted”, “completed”, or “rejected”. Tips on how to use this feature are provided in a subsequent paragraph.

Please keep in mind that a fundamental tenet of “informal comments” is that a response by the receiver of a comment is not required. They may accept, reject, or partially use a comment at their own discretion.

### **1.4 Review Objectives**

The objective of Quality Reviews is to insure that the product is consistent with established criteria, guidance, procedures, and policy. There are six primary objectives and two secondary objectives of a DQC review.

#### **The primary objectives are:**

- a. To ensure that the problem identification, plan formulation, and design concepts are valid;
- b. To ensure that the recommended plan is feasible and will be safe and functional;
- c. To ensure that a reasonable cost estimate has been developed;
- d. To ensure that the technical analyses are correct;
- e. To ensure that the product complies with policy requirements, and
- f. To ensure that it complies with accepted practice within USACE.

**The secondary objectives are:**

- a. To ensure that the recommended plan is an economical solution or meets the intent of its authorization.
- b. To assist the designer/developer of the product in catching minor quality control items that may be overlooked in the preparation of the products.

## 1.5 Types of Review Comments and Appropriate Method for Transmitting Comments

Issues/Items that should not be formally commented on using the DRChecks<sup>®</sup> system but should be passed along to the appropriate designer/developer in an informal, courtesy copy manner:

- a. Spelling, grammar, format, or language in the report. (This type of comment may be made informally, in parallel with the official technical review process. )
- b. Minor numerical errors that do not affect adequacy of the results.
- c. Alternate design solutions or analysis methods (i.e., reviewer preference), where the project designers have already used appropriate methods to develop an adequate solution.
- d. Any other issues which will not add value by making the project safe, functional, or more economical.

Issues/Items that should be formally commented on using the DRChecks<sup>®</sup> system:

- a. Is the proposed solution safe, functional, constructible, economical, and reasonable?
- b. Does the design follow USACE engineering criteria? (If not, have proper waivers been obtained?)
- c. Are appropriate analysis methods being used?
- d. Are the basic design assumptions valid?
- e. Are the calculations initialed by designers and checkers, and are results essentially correct?
- f. Is the engineering content sufficiently complete, and does it provide an adequate basis for construction?
- g. Is the design documentation adequate?

## 1.6 Commenting Process

The DrChecks portion of the ProjNet DrChecks system shall be used to submit critical DQC and ATR comments as defined above. When the Reviewer is notified that a Review has been opened in DrChecks, the reviewer shall promptly perform the review of the provided documents. Use of appropriate guidelines and procedures should result in a reasonable volume of review comments. If a Reviewer chooses to provide “Courtesy Comments”, such as those listed above, these types of comments should be furnished to the designer/developer outside of the DrChecks system, such as via Adobe’s Comment and Markup Feature as described in the following section. If these types of “informal” comments are passed along to the designer/developer, the commenter could choose to add one comment in DrChecks stating that “informal/courtesy comments were passed along to the

appropriate designer/developer” and that formal comment responses and backchecks are not necessary.

## 1.7 Comment Resolution

Comments do not necessarily have to be complied with, but each comment must be resolved, not ignored. When PDT member disagrees with a comment, the best means of resolution is a discussion between the PDT member and the Reviewer. When this does not result in an appropriate resolution, the issue should be elevated through the PDT member’s chain of command. The Review Team does not have authority to enforce comments; authority for comment resolution lies in the functional chain of command. The PM and the Review Team Leader should jointly ensure that each comment has been resolved. The final comments, and the resolution of these comments, should be included in the project documentation. Significant issues that are raised by the reviewers, and the resolution of these issues, should be included with the submittal of the project documents.

## 1.8 Comment Backcheck

When the Reviewer is notified that a Review has been opened in DrChecks for Backchecking, the Reviewer shall promptly perform a review of the responses to the comments that he/she made. If the Reviewer is satisfied with the response, the Reviewer shall “Close” the comment and add a statement to the effect that “the comment/concern has been satisfactorily addressed by the designer revising the.....”. If the Reviewer is not satisfied with the response, the comment shall be left as “Open” and the reviewer shall immediately contact the Review Team Leader and the person that provided the comment resolution. It is imperative that comments be resolved promptly and ultimately closed out or withdrawn.

## 2. How to use Adobe’s Comment and Markup Feature

The Project Manager places the PDF documents on a server location so that all reviewers can see and reply to comments as they are made.

Reviewers may download the files from the web server to your local drive or network drive. As long as you are within the corps firewall, you can still retrieve and post comments seamlessly to the remote server. This will speed up access time. You will need Adobe Acrobat 8.0 or Adobe Reader 8.0, or later, to review the documents. If you do not have access to the location of the shared review PDF files, contact the Project Manager.

Follow these steps to review the PDF documents:

- a. Open or download the file from the location as directed by the Project Manager. All comments made as of that time are automatically retrieved and shown or included in the documents.
- b. The first time you open a file, you will be asked for your name, email, and occupation. This will tag your name with your comments. Make your comments using the Adobe Comment & Markup tools.

- c. After making comments, click Publish Comments to make your comments available to other reviewers.



- d. To see the most recent comments from everyone, click Check for New Comments.

## 2.1 Tips for Project Managers

The following steps provide a quick overview of common review set-up tasks. For more detailed information, see the Help files in Adobe Acrobat under the topic of Review and Comment.

*Note: Acrobat Professional is required to enable commenting for Adobe Reader users in shared reviews and email-based reviews.*

### 2.1.1 Start an email review

An email-based review lets you track review status and merge received comments into the PDF.

- 1 Click Review & Comment and  choose Attach For Email Review.
- 2 If prompted, enter your identity information to create a reviewer profile.
- 3 Follow the on-screen instructions to select the PDF, invite reviewers, and send the email invitation. If your email application doesn't send email automatically, you may need to answer alert messages and switch to your email application to finish sending the message.

### 2.1.2 Start a shared review

A shared review allows reviewers, including those using Adobe Reader, to see and respond to others' comments during the review.

*Important: To conduct a shared review, you and your reviewers need write access to a shared comment server.*

- 1 Click Review & Comment and  choose Send For Shared Review.
- 2 If prompted, enter your identity information to create a reviewer profile.
- 3 Follow the on-screen instructions to select (or add) a server, select the PDF, invite reviewers, and send the email invitation.

### 2.1.3 Invite additional reviewers

If you initiated a review, you can invite more reviewers. If you are a reviewer, ask the initiator to add reviewers so the initiator can track all reviewers and receive notification when comments are received.

- 1 Click Review & Comment and  choose Review Tracker.
- 2 Select the desired PDF under Reviews I've Sent, and click Add Reviewers.
- 3 Follow the on-screen instructions to add email addresses, change the message as needed, and send the invitation.

## 2.1.4 Track and manage reviews

The Review Tracker provides information for all documents that you've sent and received for review. Use the Review Tracker to rejoin a review, send a reminder, or invite additional reviewers.

- 1 Click Review & Comment and  choose Review Tracker.
- 2 Select the desired PDF on the left.
- 3 Do any of the following:

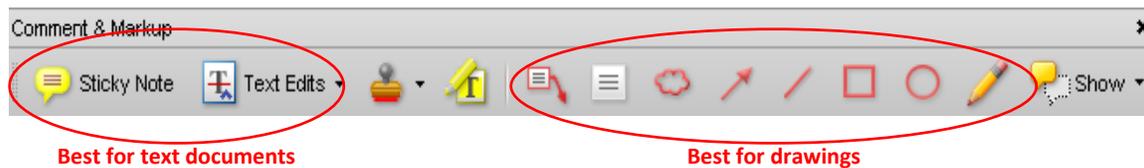
To rejoin a review, double-click the PDF.

To send a message, click Email All Reviewers or Email Initiator.

To invite additional reviewers, click Add Reviewers.

## 2.2 Tips for Reviewers

The following steps provide a quick overview of common review and commenting tasks. For more detailed information, see the Help files in Adobe Acrobat or Adobe Reader under the topic of Review and Comment. The Comment & Markup toolbar has an assortment of tools to assist with making various types of annotations and comments.



### 2.2.1 Participate in an email review

When you open the PDF attachment in an email review, a tracked copy of the PDF opens with a document message bar, a Send Comments button, and a Comment & Markup toolbar.

*Important:* If you're prompted to connect to a server when you open the PDF, you've been invited to a [shared review](#).

- 1 Open the PDF attachment from your email application.
- 2 Use commenting tools to add comments.
- 3 Save the PDF, and then click Send Comments.

### 2.2.2 Participate in a shared review

When you open the shared PDF, commenting tools and a document message bar with instructions also open. In a shared review, you can see all reviewers' comments that have been published.

- 1 Open the PDF attachment or link.
- 2 Click Connect, and type your login name and password, if prompted.

- 3 Type your name, email address, and job title to create a reviewer profile, if prompted.
- 4 Add comments.
- 5 When you want to share your comments, click Publish Comments.

### 2.2.3 Add a sticky note

The sticky note is the most common type of comment.

- 1 Click Review & Comment in  the Tasks toolbar, and then choose Add Sticky Note.
- 2 Type your comment in the pop-up note. (Your comment remains if you close the note.)
- 3 (Optional) Drag the sticky note icon or pop-up window to a new location.

You can also add other types of comments, such as [markups](#) and [text edits](#).

### 2.2.4 Mark up text with edits

Add editing markups to indicate where text should be inserted, deleted, or replaced.

- 1 Click Review & Comment  and choose Comment & Markup Tools > Text Edits Tool.
- 2 Select the text you want to edit or place the insertion point where you want to add text.
- 3 Move the pointer over the icon that appears, and choose an option from the pop-up menu, or simply begin typing.

### 2.2.5 Create drawing markups

You can add lines, arrows, and shapes to a PDF by using the drawing markup tools.

- 1 Choose Tools > Comment & Markup, and choose the desired tool.
- 2 Draw in the PDF. For example, click and drag to form a line, arrow, or rectangle.
- 3 (Optional) Using the Select tool, double-click the markup, and then type a comment in the pop-up note.

To change properties, such as line color and width, right-click/Control-click the markup and choose Properties.



**Attachment 5:  
SOW for Type II IEPR SAR**

Attached by Reference – see [FMM\_SOW\_IEPR\_TypeII\_SAR\_2012-05-3.docx]



## Adequacy Review of the USACE Red River HEC-RAS model

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July 2014

The hydrologic and hydraulic data provided by the Diversion Authority and the USACE form the basis for the evaluation of the distributed storage alternative and the socioeconomic analyses. Wenck completed an initial high-level review of the models as part of their evaluation of the distributed storage alternative. An additional layer of review was deemed necessary to better understand the model components and assumptions as they potentially impact this EIS.

The focus of this review is on the Red River HEC-RAS unsteady flow model(s). This model extends from Abercrombie, ND to Grand Forks, ND and includes the main stem, major and minor tributaries, lateral inflow, and hundreds of interconnected storage cells.

The model is based on a number of modeling decisions and assumptions; these assumptions can have a measurable impact on the results. The intent of this review is to better understand the key assumptions as they relate to the various scenarios being considered, i.e., the proposed project, the no action alternatives and the distributed storage alternative.

A very detailed examination of the HEC-RAS model was not completed, e.g., checking specific cross sections or the stage-volume curves for individual storage cells. Rather an overall review of the model structure was completed, as well as those components that define the proposed project and the two No Action alternatives and the distributed storage alternative. Only that portion of the model in the immediate vicinity of the Fargo-Moorhead area was reviewed.

### **HEC-RAS models reviewed**

HEC-RAS models for the following scenarios were downloaded from Houston Engineering ftp site:

Phase 7 hydrology (10-, 25-, 50-, 100-, and 500-year floods)

- Existing Conditions with No Protection
- Existing Conditions with Full Protection
- Proposed Project
- with USACE Phase 2 levees
- DNR Northern Alignment "C"

Phase 8 hydrology: with and without upstream distributed storage (10-, 25-, 50-, and 100-year floods)

- Existing Conditions with no protection
- Existing Conditions with full protection
- with USACE Phase 2 levees

Gregg Thielman of Houston Engineering and Diversion Authority consultant, provided the following descriptions in a March 3, 2014 email:

- The “no-protection” model includes the 4<sup>th</sup> Street levee on the Fargo side, but no other completed or pending permanent projects. Development of this condition goes back to 2009.
- The “Full Protection” model includes all permanent and emergency protection based on the City of Fargo Comprehensive Flood protection plan, the City of Moorhead flood protection projects, and emergency measures implemented during the 2009, 2010, and 2011 flood.

### **Overall Model Review**

An initial task was to compare the model output against a spreadsheet provided by Gregg Thielman on March 7, 2014 – “MNEIS HEC-RAS Profiles\_201-40307.xls”, and the plotted water surface profiles included in Aaron Snyder’s February 20, 2014 letter to Jill Townley. An exact match was found indicating that the tabulated results were generated by the provided models.

A cursory review of selected boundary conditions (inflow hydrographs) was also completed with no issues identified.

Numerous storage cells present a challenge to verify for example, the computed peak flow for the Red River Q100 at the Fargo gage equaled 34,700 cfs. However, several stream confluences were checked to verify that the computed downstream flows reasonably consistent with the flows upstream of the confluence.

While reviewing the overall model structure, numerous cross sections and computed water surface profiles were plotted. No issues with the model setup or results were identified during review.

### **Lateral Structures**

The Red River HEC-RAS model makes extensive use of “lateral structures.” This model component in large part defines how the various versions of this model represent the proposed project and the no action alternatives.

Along the rivers and smaller waterways, the HEC-RAS cross sections reflect the main flow path of the channel and immediate overbank area. The connection between the channel and the broader floodplain is generally defined in this Red River HEC-RAS model by lateral structures. Lateral structures are typically represented by a combination of weirs and culverts. Placement of these weirs is a modeling decision; typically they are placed on top roads or along the ground near the extent of the assumed effective flow area. While the model feature in HEC-RAS is called a “weir”, that doesn’t necessarily mean the actual feature on the landscape is a levee or floodwall.

If at a given point in time during a simulation the computed river stage is higher than the lateral weir at a given cross section, flow is computed across that weir into the adjacent storage cell (assuming the water surface elevation in that cell is also lower than the level in the river). Once the flood peak has passed, water can drain back into the river across that same lateral weir. Flow between/among the adjacent storage cells is also controlled by weirs and /or culverts in a similar manner. This use of

channels, lateral weirs and storage cells provides a reasonably realistic depiction of the very complex flow dynamics of the Red River and its broad floodplain. The model should accurately account for a given volume of water leaving the channel and entering an adjacent storage cell; that volume of water may then traverse several more cells before re-entering the river many miles downstream.

These lateral structures were used along the entire reach of the Red and Sheyenne Rivers as well as the smaller waterways within the F-M urban area for the Existing Conditions No Protection model runs. The “No Protection” models do not include the actual levees and floodwalls constructed since 2009. The pre-2009 levees are included in the model, e.g., near 4th Street and St. John’s Hospital.

For the “Full Protection” runs as well as the Phase 2 levee scenario, the lateral weirs along the Red River were removed. That is, the model did not allow water to leave the main river channel. In effect, the levees are assumed infinitely high and the adjacent storage cells remain dry, even during the 500-year event.

The location of the lateral structures is based on the defined effective flow limits at each cross section. The alignment of the levees and floodwalls constructed since 2009, or temporary levees constructed during a flood fight, do not necessarily fall along the same alignment as the “lateral structures” used in the HEC-RAS models. Similarly, there are minor differences between the Phase 2 levee alignments compared to the Full Protection levees. However, there is no difference in the model in regard to the alignment. In most locations the horizontal difference is relatively small (<100 feet), in other locations the difference is hundreds of feet.

In a few locations, the constructed levees in MN are within the effective flow limit defined by the cross sections. An example includes the reach in the immediate vicinity of cross sections 2423616. In all instances identified, the constructed levees are outside of the FEMA designated floodway. This suggests that the effect of this encroachment should be a small surcharge in water levels, minimized in part due to the likely decrease in peak flow due to additional staging.

The USACE Phase 2 levee model is very similar to the existing conditions w/ maximum protection model. The Lateral Structures along the Red River were removed, once again meaning that the levees were assumed infinitely high for all flood events. The alignment of the Phase 2 levees is assumed identical to the Maximum Protection levees. There were minor changes in how interior drainage was handled, as well as assumptions with a couple of adjacent storage cells. Otherwise, the two runs are identical.

### **The Proposed Project**

The key elements of the proposed project were incorporated into the HEC-RAS model, including the control structures on the Red and ND Wild Rice Rivers, the diversion channel and its inlet control structure, and the connections with the ND tributaries.

The three control structures have operable features. Obviously much work remains in more fully defining how the three control structures would operate over a wide range of possible flood scenarios. For this modeling exercise, the operation seems to match the general description of how the Project

would function. Selected model output is tabulated below, allowing comparison to the description of the Project.

Flood Return Period	Staging Area Peak Elev.	Red River		ND Wild Rice R	Diversion Channel	
		Qpeak (cfs) Below dam	Stage @ Gage	below dam Q (cfs) after closure	Qpeak (cfs) Inlet	Outlet
10-year	908.2	11,200	34.8	NA	150	3,800
25-year	919.5	17,200	35.1	200	9,000	15,400
50-year	921.5	17,200	35.1	200	20,000	26,900
100-year	922.2	17,100	35.1	200	20,000	31,000
500-year	922.2	27,000	40.0	2,000	20,000	37,200

The HEC-RAS model for the Project does include the lateral weirs discussed in the previous section. That means the Project model does not reflect the levees that were added to the project to allow higher flows through town for up to the 100-year event. Nor does this model account for the recently constructed permanent measures in both Fargo and Moorhead, or any emergency flood fight measures. This should not pose an issue for the 10- through 100-year floods as little overbank flooding occurs with a Red River water surface profile at a 35 foot gage height.

It potentially becomes an issue for the 500-year event. The flood inundation maps for the 500-year flood show significant areas on both sides of river flooded during the 500-year flood with the proposed project. The 500-year inundation area will include areas that would likely be protected by existing levees constructed to 44 gage height (four feet of freeboard), with appropriate emergency measures.

This model is consistent with the concept that the proposed project would be certified to provide 100-year protection, but not necessarily 500-year flood protection.

**DNR Northern Alignment Alternative**

The HEC-RAS model for the EIS Northern Alignment Alternative was just recently received. In this model, the lateral structures along the Red River are included, but their elevation reflects a 44 foot gage height. This represents a continuous levee, both sides of the river to that height, even though not all levees have been constructed to that height. The lands outside of these levees are shown protected, unlike for the Project model.

The results for the EIS Northern Alignment Alternative should not be compared to the Project, downstream of the dam. It is reasonable to use/compare the model results for the Project and the Northern Alignment Alternative within, and upstream of their respective staging areas.