

REVIEW PLAN

ROUGH RIVER DAM

DAM SAFETY MODIFICATION

BRECKINRIDGE, HARDIN AND GRAYSON COUNTIES,
KENTUCKY

IMPLEMENTATION PHASE

LOUISVILLE DISTRICT

JANUARY 2013



**US Army Corps
of Engineers ®**

REVIEW PLAN

Rough River Dam
Breckinridge, Hardin and Grayson Counties, Kentucky
Dam Safety Modification
Implementation Phase

TABLE OF CONTENTS

1. PURPOSE AND REQUIREMENTS 3

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION 4

3. PROJECT INFORMATION..... 4

4. DISTRICT QUALITY CONTROL (DQC) 6

5. AGENCY TECHNICAL REVIEW (ATR)..... 6

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR) 8

7. POLICY AND LEGAL COMPLIANCE REVIEW 9

8. REVIEW SCHEDULES AND COSTS..... 9

9. PUBLIC PARTICIPATION..... 10

10. MSC APPROVAL 10

11. REVIEW PLAN POINTS OF CONTACT..... 10

ATTACHMENT 1: TEAM ROSTERS 11

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW..... 14

ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS 14

ATTACHMENT 4: REVIEW PLAN REVISIONS..... 14

1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the Rough River Dam, KY; Dam Safety Modification; Implementation Phase

b. References

- (1) Engineer Regulation (ER) 1110-2-12, Quality Management, 30 Sep 2006
- (2) Engineer Regulation (ER) 1110-2-1156, Safety of Dams – Policy and Procedures, July 2009
- (3) Engineer Circular (EC) 1165-2-214, Civil Works Review, 15 Dec 2012

c. Requirements. This review plan was developed in accordance with EC 1165-2-209, which establishes 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 through independent review. The EC outlines three levels of review: District Quality Control, Agency Technical Review, and Independent External Peer Review.

- (1) District Quality Control (DQC). DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). It is managed in the home district and may be conducted by staff in the home district as long as they are not doing the work involved in the study, including contracted work that is being reviewed. Basic quality control tools include a Quality Management Plan providing for seamless review, quality checks and reviews (including quality control performed by contractors), supervisory reviews, Project Delivery Team (PDT) reviews, etc. Additionally, the PDT is responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before approval by the District Commander. The Major Subordinate Command (MSC)/District quality management plans address the conduct and documentation of this fundamental level of review; DQC is not addressed further in this review plan.
- (2) Agency Technical Review (ATR). ATR is an in-depth review, 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 this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assure that all the parts fit together in a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists (RTS), etc.), 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.
- (3) Independent External Peer Review (IEPR). 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. IEPR is generally for feasibility and reevaluation

studies and modification reports with Environmental Impact Statements (EISs). IEPR is managed by an outside eligible organization (OEO) that is described in Internal Revenue Code Section 501(c) (3), is exempt from Federal tax under section 501(a) of the Internal Revenue Code of 1986; is independent; is free from conflicts of interest; does not carry out or advocate for or against Federal water resources projects; and has experience in establishing and administering IEPR panels. The scope of review will address all the underlying planning, engineering, including safety assurance, economics, and environmental analyses performed, not just one aspect of the project.

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for implementation documents is typically the Risk Management Center (RMC). The RMO for the peer review effort described in this Review Plan is the RMC.

3. PROJECT INFORMATION

- a. Implementation Document.** The documents to be reviewed during the implementation phase will consist of the plans and specifications, and all supporting documents that are required in support of development of the plans and specifications.

Background: The Rough River Dam Safety Modification Study (DSMS) was prompted by the 2005 Screening Portfolio Risk Assessment (SPRA) cadre team's recommendation that Rough River Dam receive a Dam Safety Action Classification (DSAC) of II, which is described as "Urgent" (Unsafe or Potentially Unsafe). A dam with this classification is considered to have failure initiation foreseen or very high risk. Since no additional authorization by Congress is required to address the dam safety issues, a DSMR was prepared in accordance with ER 1110-2-1156.

The DSMR was reviewed by CELRD, the Risk Management Center (RMC), and HQUSACE for Policy Compliance. The RMC reviewed the risk estimate and verified that the risk estimate was in compliance with the current USACE risk methodology. The RMC reviewed the risk management recommendations and evaluated the estimated risk reductions.

The District Dam Safety Officer (DSO), CELRD DSO, the Chairman of the HQUSACE Dam Safety Senior Oversight Group, and the HQUSACE DSO signed the approval memorandum on 27 August 2012. This approval memorandum stated that all agency requirements, certifications, and reviews have been completed and the Environmental Assessment and signed Finding of No Significant Impact have been satisfactorily completed and signed.

The DSMR was then transmitted to the Assistant Secretary of the Army for Civil Works indicating that the design phase of the project will be initiated. The intended outcome of this document is approval to initiate risk reduction action at Rough River Dam.

b. Study/Project Description. The flood protection plan for the Ohio River Basin, which included the construction of the Rough River Dam, was authorized by the Flood Control Act approved 28 June 1938 (Public Law 761, 75th Congress, 3rd Session), revised under a report titled “Rough River and Tributaries, Kentucky” and published as House Document No. 535, 78th Congress, 2nd Session, 1944. Construction began in November 1955 and ended in December 1960.

A Dam Safety Modification Report (DSMR) was completed for this project as described in paragraph (a) above. This report was prepared in response to a Dam Safety Action Classification (DSAC) Class II (urgent-unsafe or potentially unsafe) ranking for Rough River Dam. This ranking was established by the Senior Oversight Group subsequent to an evaluation through the Screening Portfolio Risk Assessment (SPRA) program conducted in 2005.

The main objective of the DSMS is to evaluate dam safety issues or conditions at a dam that result in unacceptable life safety, economic and environmental risks, and consider various dam safety modifications to reduce the project risk below current USACE tolerable risk guidelines. The principal risk driver identified from the risk assessment performed in support of the DSMR is seepage and piping through untreated, solutioned, and/or excavation-damaged bedrock beneath the dam. A secondary component of the risk is associated with the potential seepage paths through the embankment along the conduit due to the lack of a proper filter around the conduit. Structural and non-structural risk reduction measures were identified and evaluated to formulate alternative plans associated with varying degrees of permanent risk reduction; and to ultimately recommend a cost effective, technically feasible alternative plan that minimizes adverse environmental, economic and social effects. The intent of the selected alternative plan is to allow the project to operate within current USACE tolerable risk guidelines for the foreseeable future. An evaluation of the modified annual probability of failure, reduced life safety risks, As-Low-As-Reasonably-Practicable considerations, and current USACE tolerable risk guidelines form the basis for plan selection.

In accordance with EC-1110-2-6064, an Interim Risk Reduction Measures Plan (IRRMP) was developed and implemented for Rough River Dam subsequent to receiving its DSAC II Rating. The IRRMP is included in the DSMR.

Multiple Risk Management Alternative Plans were evaluated as part of the DSMR. The alternatives that were considered are: 1. Do Nothing, 2. Reservoir Restriction, 3. Foundation Grouting, Conduit Grouting and Conduit Filter, 4. Cutoff Wall with Foundation Grouting, Conduit Grouting and Conduit Filter, 5. Remove Structure, and 6. Remove and Replace Structure. The recommended alternative is construction of a full depth cutoff wall with foundation and conduit grouting and a conduit filter. The cutoff wall would have a depth of approximately 175 feet. The estimated cost of this repair as presented in this report is \$147,000,000. The operation and maintenance of this Federally-owned dam is 100% Federal responsibility.

c. Factors Affecting the Scope and Level of Review. The main factor affecting the scope and level of review is the expertise required in the following areas: a) Dam Safety & Embankment Dam Design; b) Seepage and Piping Analysis; c) Cut off Wall Construction and Grouting.

d. In-Kind Contributions. Not Applicable

4. DISTRICT QUALITY CONTROL (DQC)

All implementation documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). 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 home MSC. 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. 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. Additionally, the PDT is responsible to ensure consistency and effective coordination across all project disciplines during project design and construction management. See Tables 1 and 2 in Attachment 1 for PDT and DQC team members.

a. Documentation of DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC. DrChecks review software will be used to document comments to the plans and specs.

b. Products to Undergo DQC. The plans and specs, along with any other supporting documents, will undergo DQC.

5. AGENCY TECHNICAL REVIEW (ATR)

General. ATR is mandatory for all implementation documents (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published USACE guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR reviews are conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

- a. Products for Review.** An ATR review will be performed on all sets of plans and specifications; as well as all other pertinent supporting documents used during the implementation phase. A signed Certification of Agency Technical Review will be provided upon completion.
- b. Required ATR Team Expertise.** The ATR team will consist primarily of senior USACE personnel (Regional Technical Specialists (RTS), etc.) primarily from LRD. The disciplines on the ATR team will reflect the key disciplines involved in the development of the plans and specs. The chief criterion for being a member of the ATR team is knowledge of the technical discipline and relevant experience. A list of the ATR members and disciplines is provided in Attachment 1. These were the members of the ATR team during the recently-completed DSMR. All efforts will be made to retain this team during the plans and specifications phase.
- c. Documentation of ATR.** DrChecks review software was used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will normally include:
- (1) The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;
 - (2) The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
 - (3) The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
 - (4) The probable specific action needed to resolve the concern – identify the action(s) that the PDT must take to resolve the concern.

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

- Disclose the names of the reviewers, their organizational affiliations, and their disciplines;
- Describe the nature of their review and their findings and conclusions; and
- Include a verbatim copy of each reviewer's comments and the PDT's responses.

ATR may be certified when all ATR concerns are either resolved or referred to HQUSACE for resolution and the ATR documentation is complete. A sample certification is included in ER 1110-2-12 and shown in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

I. Type I IEPR

- a. General.** Type I IEPR is conducted for decision documents if there is a vertical team decision (involving the district, MSC, PCX, and HQUSACE members) that the covered subject matter meets certain criteria (described in EC 1165-2-209) where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside the USACE is warranted. Type I IEPR is coordinated by the appropriate PCX and managed by an Outside Eligible Organization (OEO) external to the USACE. Type I IEPR panels shall evaluate whether the interpretations of analysis and conclusions based on analysis are reasonable.
- b. Decision on Type I IEPR.** A Type I IEPR is not required during the Implementation Phase of the project. A Type I IEPR was performed by Noblis, Inc. during the development of the Rough River Dam Safety Modification Report (DSMR).
- c. Products for Review.** N/A
- d. Required IEPR Panel Expertise.** N/A
- e. Documentation of IEPR.** N/A

II. Type II IEPR Safety Assurance Review (SAR)

- a. General.** A Type II IEPR (SAR) shall be conducted on design and construction activities for hurricane and storm risk management and flood risk management projects, as well as other projects where potential hazards pose a significant threat to human life. This applies to new projects and to the major repair, rehabilitation, replacement or modification of existing facilities. 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.
- b. Decision on Type II IEPR.** A Type II IEPR will be required for this project during the Implementation Phase.
- c. Products for Review.** The Type II IEPR will be performed on the plans and specifications and during the construction phase.

- d. Required IEPR Panel Expertise.** The Type II IEPR should consist of a three person panel to include members that have expertise in the following areas: a) Dam Safety & Embankment Dam Design; b) Seepage and Piping Analysis; c) Cut off Wall Construction and Grouting.
- e. Documentation of Type II IEPR.** DrChecks review software will be used to document the Type II IEPR comments and aid in the preparation of the Review Report. Comments should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. Type II IEPR comments should generally include the same four key parts as described for ATR comments in Section 5. The OEO will be responsible for compiling and entering comments into DrChecks. The Type II IEPR team will prepare a Review Report that will accompany the publication of the final report for the project and shall:
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
 - Include the charge to the reviewers prepared by the RMC;
 - Describe the nature of their review and their findings and conclusions; and
 - Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

The final Review Report will be submitted by the Type II IEPR panel no later than 60 days following each milestone.

7. POLICY AND LEGAL COMPLIANCE REVIEW

All implementation documents will be reviewed throughout the project for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies.

8. REVIEW SCHEDULES AND COSTS

- a. ATR Schedule and Cost.** The ATR for the first set of plans and specs is currently scheduled for October 2013.
- b. IEPR Schedule and Cost.** A Type II IEPR will be required for this project. Initial indications are that the estimated cost for the Type II IEPR is in the range of \$100,000 to \$125,000. This estimate will be refined later in FY13 when the Scope of Work for the IEPR

Type II contract is completed. The IEPR Type II contractor will be involved with the project through the construction phase and into the OMRRR phase.

9. PUBLIC PARTICIPATION

It is anticipated that public meetings will be held as necessary through completion of the project modification. The public was provided the opportunity to review and comment on the Environmental Assessment.

10. MSC APPROVAL

The MSC that oversees the home district is responsible for approving the review plan. Approval is provided by the MSC Commander. The commander's approval should reflect vertical team input (involving district, MSC, and HQUSACE members) as to the appropriate scope and level of review during the implementation phase. Like the PMP, the review plan is a living document and may change as the project progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval will be documented in Attachment 4. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

11. REVIEW PLAN POINTS OF CONTACT

Questions and/or comments on this review plan can be directed to the following points of contact:

ATTACHMENT 1: TEAM ROSTERS

TABLE 1: Project Delivery Team (PDT)		
Functional Area	Name	Office Symbol
Key Team Members		
Project Manager		PM-C
1. Geotechnical		ED-T-G
2. Geologist		ED-T-G
3. Cost Engineering		ED-M-C
4. Hydrology and Hydraulics		ED-T-H
5. Structural		ED-D-N
6. Civil / Site		ED-T-C
7. NEPA, Section 106		PM-P
8. Real Estate Division		RE-C
9. Operations Division		OP-GR-R
10. Public Affairs		PA
11. DSPC Technical Oversight		LRH-DSPC-GS
12. Construction		CD-K-K

TABLE 2: District Quality Control (DQC) Team		
Functional Area	Name	Office Symbol
Key Team Members		
1. Geotechnical		ED-T-G
2. Geologist		ED-T-G
3. Cost Engineering		ED-M-C
4. Hydrology and Hydraulics		ED-T-H
5. Structural		ED-D-N
6. Civil / Site		ED-T-C
7. NEPA, Section 106		PM-P
8. Real Estate Division		RE-C
9. Operations Division		OP-TO
10. Construction		CD-K-K

TABLE 3: Agency Technical Review (ATR) Team		
NAME	DISCIPLINE	OFFICE SYMBOL
	Team Leader	CESPD-RBT
	Geotechnical	CELRH-EC-GS

	Hydraulics	CELRP-TS-DD
	Cost Engineering	CENWW-EC-X
	Civil	CELR-ED-T-C
	Geology	CESWL-EC-D
	Environmental	CELRN-PM-P
	Construction	CD

Vertical Team

The Vertical Team consists of members of the HQUSACE and CELRD Offices. The Vertical Team plays a key role in facilitating execution of the DSMS in accordance with the PMP. The Vertical Team is responsible for providing the PDT with Issue Resolution support and guidance as required. The Vertical Team will remain engaged seamlessly throughout the DSMS via monthly telecons as required and will attend In Progress Reviews and other key decision briefings. The CELRD District Liaison is the District PM’s primary Point of Contact on the Vertical Team.

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR IMPLEMENTATION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Plans and Specs for the Rough River, KY Dam Safety Modification Project. 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 DrCheckssm.

SIGNATURE

ATR Team Leader

Date

SIGNATURE

Project Manager

Date

SIGNATURE

Director of RMC
Review Management Office

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:
As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE

Chief, Engineering Division

Date

ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS

<u>Term</u>	<u>Definition</u>	<u>Term</u>	<u>Definition</u>
AFB	Alternative Formulation Briefing	NED	National Economic Development
ASA(CW)	Assistant Secretary of the Army for Civil Works	NER	National Ecosystem Restoration
ATR	Agency Technical Review	NEPA	National Environmental Policy Act
CSDR	Coastal Storm Damage Reduction	O&M	Operation and Maintenance
CWRB	Civil Works Review Board	OMB	Office of Management and Budget
DPR	Detailed Project Report	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DQC	District Quality Control	OEO	Outside Eligible Organization
DX	Directory of Expertise	OSE	Other Social Effects
EA	Environmental Assessment	PCX	Planning Center of Expertise
EC	Engineer Circular	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PAC	Post Authorization Change
EO	Executive Order	PMP	Project Management Plan
ER	Ecosystem Restoration	PL	Public Law
FDR	Flood Damage Reduction	QMP	Quality Management Plan
FEMA	Federal Emergency Management Agency	QA	Quality Assurance
FRM	Flood Risk Management	QC	Quality Control
FSM	Feasibility Scoping Meeting	RED	Regional Economic Development
GRR	General Reevaluation Report	RTS	Regional Technical Specialist
HQUSACE	Headquarters, U.S. Army Corps of Engineers	USACE	U.S. Army Corps of Engineers
IEPR	Independent External Peer Review	WRDA	Water Resources Development Act
ITR	Independent Technical Review		
LRR	Limited Reevaluation Report		
MSC	Major Subordinate Command		

ATTACHMENT 4: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number