



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS SOUTH ATLANTIC DIVISION
60 FORSYTH STREET SW, ROOM 10M15
ATLANTA, GA 30303-8801

CESAD-RBT

15 September 2016

MEMORANDUM FOR COMMANDER, WILMINGTON DISTRICT

SUBJECT: Approval of Review Plan for Plans, Specifications and Design Documentation Report for the Island Creek Underseepage Filter, Mecklenburg County, VA

1. References:

a. Memorandum, CESAW-ECP-E, 29 July 2016, subject: Approval of Review Plan for Island Creek Underseepage Filter, Mecklenburg County, VA, Implementation Documents (Encl).

b. EC 1165-2-214, Civil Works Review, 15 December 2012.

2. The Review Plan (RP) for the Plans, Specifications and Design Documentation Report for the Island Creek Underseepage Filter, submitted by the Wilmington District via reference 1.a has been reviewed by this office and is hereby approved in accordance with reference 1.b above.

3. SAD concurs with the conclusion of the Wilmington District that a Type II Independent External Peer Review (IEPR) is not required. The primary basis for the concurrence that a Type II IEPR is not required is that the addition of the berm and seepage collection system to the existing dam is to be done without excavation of the existing dam structure and the determination that the failure or loss of the Underseepage Filter would not pose a significant threat to human life.

4. The District should take steps to post the approved RP to its web site and provide a link to CESAD-RBT. Before posting to the web site, the names of Corps/Army employees should be removed in accordance with references above. Subsequent significant changes to this RP, such as scope changes or level of review, should they become necessary, will require new written approval from this office.

CESAD-RBT

SUBJECT: Approval of Review Plan for Plans, Specifications and Design
Documentation Report for the Island Creek Underseepage Filter, Mecklenburg
County, VA

5. The SAD point of contact is [REDACTED] CESAD-RBT, [REDACTED] or
email: [REDACTED]@usace.army.mil.

Encl


C. DAVID TURNER
Brigadier General, USA
Commanding

CF:
CESAW-ECP-E/[REDACTED]
CESAW-ECP-E [REDACTED]
CESAW-ECP-EG [REDACTED]



DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

CESAW-ECP-E

29 July 2016

MEMORANDUM FOR Commander, US Army Corps of Engineers, South Atlantic Division
(CESAD-RBT), ATTN: [REDACTED] CESAD-RBT, Rm 10M15, 60 Forsyth Street, SW,
Atlanta, Georgia 30303-8801

SUBJECT: Approval of Review Plan for Island Creek Underseepage Filter, Mecklenburg
County, VA, Implementation Documents


1. Reference

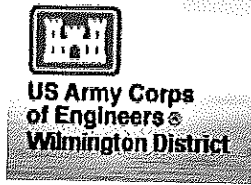
EC 1165-2-214, Civil Works Review Policy, 15 Dec 2012

2. I hereby request approval of the enclosed Review Plan for Island Creek Underseepage Filter, Mecklenburg County, VA, Implementation Documents. The Review Plan complies with applicable policy and includes DQC and ATR plans for this project. Also, SAW-Dam Safety Officer and Chief of Engineering agree with the Review Plan as submitted.

3. The District will post the Corps of Engineers, South Atlantic Division approved Review Plan to its website and provide a link to CESAW for its use. Names of Corps/Army employees are withheld from the posted version, in accordance with guidance.

Encl


KEVIN P. LANDERS SR.
COL, EN
Commanding



Review Plan

For

**Island Creek Dam Underseepage Filter,
– Implementation Documents**

**Mecklenburg County, Virginia
P2 #: 111638**

**U.S. Army Corps of Engineers
Wilmington District
Wilmington, North Carolina**

July 2016

THE INFORMATION CONTAINED IN THIS REVIEW PLAN IS DISTRIBUTED SOLELY FOR THE PURPOSE OF PREDISSEMINATION REVIEW UNDER APPLICABLE INFORMATION QUALITY GUIDELINES. IT HAS NOT BEEN FORMALLY DISSEMINATED BY THE U.S. ARMY CORPS OF ENGINEERS, WILMINGTON DISTRICT. IT DOES NOT REPRESENT AND SHOULD NOT BE CONSTRUED TO REPRESENT ANY AGENCY DETERMINATION OR POLICY.

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1. PURPOSE AND REQUIREMENTS

1.1 Purpose

This Review Plan defines the scope and level of review activities for design of the Island Creek Dam Underseepage Filter, located in Mecklenburg County, VA. The design will consist of a berm on the Island Creek side of the dam constructed with earth fill and incorporating a filter and drain system to collect seepage. The berm will be placed along the eastern portion of the dam and will avoid the intake area and the original location of Island Creek in the western portion of the dam. The review activities consist of District Quality Control (DQC) and Agency Technical Review (ATR). The project is in the design and implementation phase and the related documents are a 95% Design Documentation Report (DDR) and 95% Plans and Specifications (P&S). Upon approval, this review plan will be included into the Project Management Plan.

1.2 References

- ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug. 1999
- ER 1110-1-12, Engineering and Design Quality Management, 31 March 2011
- EC 1165-2-214, Civil Works Review, 15 Dec. 2012
- Engineering and Construction Bulletin, No. 2016-9, 04 Mar 2016
- ER 415-1-11, Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review, 1 January 2013
- ER-1110-2-1156, Safety of Dams – Policy & Procedures, 31 March 2014
- EC-1165-2-216, Policy and Procedural Guidance for Processing Requests to Alter U.S. Army Corps of Engineers Civil Works Projects Pursuant to 33 USC 408, 31 July 2014
- Quality Control Plan
- Project Management Plan
- Review Plan for Island Creek Dam Interim Risk Reduction Measures Plan Update with Risk Management Center's endorsement, 30 November 2015

1.3 Requirements

This review plan was developed in accordance with EC 1165-2-214, which 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). The EC 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 other work products. The EC outlines three levels of review for implementation documents: District Quality Control, Agency Technical Review, and Independent External Peer Review. Refer to the EC for the definitions and procedures for the three levels of review.

1.4 Review Management Organization (RMO).

The South Atlantic Division is designated as the RMO for this effort. The Risk Management Center has agreed to SAD being the RMO for this design effort.

2. PROJECT INFORMATION AND BACKGROUND

2.1 Project Description

Island Creek Dam is an auxiliary earth dam and pumping station on Island Creek and is a component of the John H. Kerr Dam and Reservoir. The John H. Kerr Dam is located in Mecklenburg County, Virginia, on the Roanoke River. The project extends into portions of Mecklenburg, Charlotte, and Halifax Counties in Virginia and Warren, Vance, and Granville Counties in North Carolina. The reservoir stretches approximately 39 miles upstream of the dam on the Roanoke River and 19 miles upstream on the Dan River from its confluence with the Roanoke. Kerr Dam is a concrete gravity dam 2,785 feet long with a maximum height of 144 feet. The reservoir is operated as a unit of a coordinated reservoir system for flood damage reduction in the Roanoke River basin and provides generation of hydroelectric power.

Island Creek Dam was constructed to prevent inundation of the Tungsten Queen mine which was a critical material needed for National Defense at the time of the development of the John H. Kerr Dam and Reservoir. The pump station at Island Creek moves surface water runoff from the Island Creek drainage basin into John H. Kerr Reservoir. The station contains three pumps, each rated at 1750 HP, 89000 gallons per minute at 48.5 total dynamic head. Dam and pump station construction was completed in September 1955.

Wet areas on the downstream portion of the dam were first observed in 1978 (PI 1) with certain water levels in Kerr Lake. It was later noted (PI 3 1983) that when Kerr Lake pool elevation was about 307 ft msl, seeps were active; with lake level below 300 ft msl, areas were saturated or damp with no visible seepage. Later inspections (PI 5 1993, PI 6 (1998), PI 7 2003, PI 8 2008 and PI 9 2013) listed seepage or wet areas in 3 locations.

Stability analyses have been performed since 1986 but no piezometers had yet been installed to fully evaluate the phreatic surface. Later more advanced modeling concluded that there were wide variations in the Factors of Safety depending upon the location of the phreatic surface, so additional piezometers were installed and monitored.

In 2011 trees were removed from below the toe of the dam and active seepage areas were discovered. Nine additional piezometers were installed to monitor the phreatic surface and seepage. Cone Penetration Tests (CPT) were completed as well to provide more data for future analyses.

Currently, temporary inverted weighted sand filters have been installed over the major seepage areas as an interim risk reduction measure. Seepage continues from these filters, but cannot be measured.

2.2 Proposed Work Description

The approach for this design is to be proactive with available Operations & Maintenance funding and provide a design for a permanent remedy to seepage and stability problems at Island Creek Dam. The concept design described in the DDR consists of an earthen berm constructed at the toe of the existing dam incorporating an underseepage filter. Seepage will be collected and discharged on site thru v-notch weirs.

The project cost is expected to be less than \$5M. The concept design only adds a berm and a seepage collection system to the existing earth dam without excavation of the existing dam structure. There is no negative impact to the stability of the dam during the construction period and when constructed, stability is increased.

3. DISTRICT QUALITY CONTROL

District Quality Control (DQC) and Quality Assurance activities for implementation documents (DDRs and P&S) are stipulated in ER 1110-1-12, Engineering & Design Quality Management. The subject project Design Documentation Report (DDR) and Plans and Specifications (P&S) will be prepared by the Wilmington District using the SAW procedures and will undergo DQC at 95% completion. DQC Certification will be verified by the Agency Technical Review Team.

4. AGENCY TECHNICAL REVIEW

Agency Technical Review (ATR) is undertaken to "ensure the quality and credibility of the government's scientific information" in accordance with EC 1165-2-214 and ER 1110-1-12. An ATR will be performed on the Plans and Specifications and Design Documentation Report.

ATR will be conducted by individuals and organizations that are external to the Wilmington District (SAW). The ATR Team Leader will be a Corps of Engineers employee outside the South Atlantic Division. The required disciplines and experience are described below.

4.1 ATR Team Expertise

As stipulated in ER 1110-1-12, ATR members will be sought from the following sources: regional technical specialists (RTS); appointed subject matter experts (SME) from other districts; senior level experts from other districts; Center of Expertise staff; appointed SME or senior level experts from the responsible district; experts from other U.S. Army Corps of Engineers Districts; contractors; academic or other technical experts; or a combination of the above. The ATR will be conducted for the 95% DDR and 95% P&S. The ATR Team will be comprised of the following disciplines; knowledge, skills and abilities; and experience levels.

ATR Team Leader. The ATR lead will be a senior registered professional with experience in earthen dam safety matters and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. Typically, the ATR lead will

also serve as a reviewer for a specific discipline (such as geotechnical, site engineering, planning, etc).

Geotechnical Engineering. Team member will be a registered professional familiar with design of earthen dams and evaluations of existing earthen dams. Team member will have a thorough understanding of the specific requirements based on study objectives and proposed measures – for example, slope stability and seepage modeling, to assure that the project meets good engineering practice and dam safety requirements.

Civil/Site Engineering. Team member will be a registered professional engineer and have experience with Civil/Site design and construction that includes embankment design for dams.

NEPA Compliance. The team member should have experience in NEPA compliance activities and preparation of Environmental Assessments and Environmental Impact Statements for earthen dam embankment projects.

4.2 Documentation of ATR

DrCheckssm review software will be used to document all ATR comments, responses, and associated resolutions accomplished throughout the review process. Comments are expected to 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 be 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 reporting officers 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 DrCheckssm 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 vertical team for resolution. Review Reports will be considered an integral part of the ATR documentation 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 an overview for the project information in which the ATR members were charged to review;
- 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 ATR may be certified when all ATR concerns are either resolved or referred to U.S. Army Corps of Engineers South Atlantic Division (CESAD) for resolution and the ATR documentation is complete. Certification of ATR should be completed, based on work reviewed for the 95% DDR and P&S. A sample certification is included in this Review Plan (see attachment 2).

5. BIDDABILITY, CONSTRUCTABILITY, OPERABILITY, ENVIRONMENTAL, AND SUSTAINABILITY REVIEW

The value of a BCOES review is based on minimizing problems during the construction phase through effective checks performed by knowledgeable, experienced personnel prior to advertising for a contract. Biddability, constructability, operability, environmental, and sustainability requirements must be emphasized throughout the planning and design processes for all programs and projects, including during planning and design. This will help to ensure that the government's contract requirements are clear, executable, and readily understandable by private sector bidders or proposers. It will also help ensure that the construction may be done efficiently and in an environmentally sound manner, and that the construction activities and projects are sufficiently sustainable. Effective BCOES reviews of design and contract documents will reduce risks of cost and time growth, unnecessary changes and claims, as well as support safe, efficient, sustainable operations and maintenance by the facility users and maintenance organization after construction is complete. A BCOES Review will be conducted for this project at the Final Design Phase.

6. INDEPENDENT EXTERNAL PEER REVIEW (WRDA 2007 Section 2035 Safety Assurance Review)

EC 1165-2-214 provides implementation guidance for both Sections 2034 and 2035 of the Water Resources Development Act (WRDA) of 2007 (Public Law (P.L.) 110-114). The EC addresses review procedures for both the Planning and the Design and Construction Phases (also referred to in USACE guidance as the Feasibility and the Pre-construction, Engineering and Design Phases). The EC defines Section 2035 Safety Assurance Review (SAR), Type II Independent External Peer Review (IEPR). The EC also requires Type II IEPR be managed and conducted outside the Corps of Engineers.

6.1 Type I IEPR

A Type I IEPR is associated with decision documents. No decision documents are addressed/covered by this Review Plan. A Type I IEPR is not applicable to the implementation documents covered by this Review Plan.

6.2 Type II IEPR, Determination

This Underseepage Filter project does not trigger WRDA 2007 Section 2035 factors for Safety Assurance Review (termed Type II IEPR in EC 1165--2-214) and therefore, a Type II IEPR review under Section 2035 and/or EC 1165-2-214 is not required. The factors in determining whether a review of design and construction activities of a project is necessary, as stated under Section 2035 and EC 1165-2-214 along with this review plans' applicability statement which follows.

- (1) The failure of the project would pose a significant threat to human life.

The underseepage filter system will reduce the threat to human life. The existing dam will be more stable and seepage will be better monitored and measured, reducing the likelihood of a breach and thus reducing risk to human life. Construction would incorporate existing engineering standards/methods and will lower risk below tolerable risk guidelines.

- (2) The project involves the use of innovative materials or techniques.

The underseepage filter system uses standard materials and construction methods familiar to earthwork contractors.

- (3) The project design requires redundancy, resiliency and robustness.

The underseepage filter system will increase the stability of the current dam. During construction, the stability of the current dam will not be affected and the dam and pumping station will operate as normally required with full functionality.

- (4) The project has unique construction sequencing or a reduced or overlapping design construction schedule.

The project design is not anticipated to require unique construction sequencing, or a reduced or overlapping design construction schedule. The construction sequence has been used successfully by the Corps of Engineers on other similar works.

As indicated above, this project does not pose a significant threat to human life, and does not trigger any of the EC 1165-2-214 factors for Type II IEPR. Therefore, the District Chief of Engineering, as the Engineer in Responsible Charge has determined that a Type II IEPR of these implementation documents (DDR and P&S) is not needed.

7. MODEL CERTIFICATION AND APPROVAL

The use of certified or approved engineering models is required for all activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required). The following engineering models are anticipated to be used:

MODEL	STATUS
Geostudio SLOPE/W and SEEP/W	Certified
MII 4.3 Build 7 (Microcomputer Aided Cost Engineering System)	Certified

8. ESTIMATED COSTS AND SCHEDULE

8.1 Project Milestones

95% Plans and Specifications & DDR Review:

District Quality Control	1 Nov 2016
ATR	9 Dec 2016
District BCOE	23 Jan 2017
BCOE Certification	6 Feb 2017
Issue Date	27 Apr 2017
Bid Opening	30 May 2017
Construction Contract Award 1	13 Jun 2017

8.2 ATR Schedule and Cost

The ATR's will be conducted in FY17. It is envisioned that each reviewer will be afforded 28 hours review plus 4 hours for coordination. It is envisioned that the ATR Leader will be allowed 40 hours if also serving as a reviewer. The estimated cost range is \$10k - \$25k. The estimated ATR schedule follows.

ATRT Selected and Resourced	TBD
ATR Kickoff and ATR Start	2 Nov 2016
ATRT Completes Comments	2 Dec 2016
PDT Completes Evaluations	7 Dec 2016
ATRT Completes Back Checks	9 Dec 2016
ATR Certification	12 Dec 2016

9. POINTS OF CONTACT

Per guidance, the names of the following individual will not be posted on the Internet with the Review Plan. Their titles and responsibilities are listed below.

Wilmington District POCs:

Review Plan, ATR and QM Process,

Dam Safety Program Manager

Project Manager (PM):

Chief of Geotechnical,
and Dam Safety:

Chief of Engineering Branch,
and Dam Safety Officer:

South Atlantic Division POC:



10. MSC APPROVAL

The MSC that oversees the home district is the South Atlantic Division and it is responsible for approving the review plan. Approval will be 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 for the pre-construction and engineering design phase of this effort. Like a PMP, the Review Plan (RP) is a living document and may change as work progresses. Significant changes to the RP should be approved by following the process used for initially approving the RP. In all cases the MSCs will review the decision on the level of review and any changes made in updates to the project scope.

Attachment 1

ACRONYMS AND ABBREVIATIONS

ATR – Agency Technical Review
ATRT – Agency Technical Review Team
BCOE – Biddability, Constructability, Operability and Environmental
CESAD – U.S. Army Corps of Engineers South Atlantic Division
DCP – District Control Plan
DDR – Design Documentation Report
DQC – District Quality Control
EC – Engineer Circular
EIS – Environmental Impact Statements
ER – Engineer Regulations
HQUSACE – Headquarters U.S. Army Corps of Engineers
IEPR – Independent External Peer Review
MSC – Major Subordinate Command
PDT – Project Delivery Team
PMP – Project Management Plan
P&S – Plans and Specifications
RMC – USACE Risk Management Center
RMO – Review Management Organization
RP – Review Plan
RTS – Regional Technical Specialists
SAD – South Atlantic Division
SAW – Wilmington District
SAR – Safety Assurance Review
SME – Subject Matter Expert
USACE – U.S. Army Corps of Engineers
WRDA – Water Resources Development Act

Attachment 2

COMPLETION OF AGENCY TECHNICAL REVIEW

The _____ District has completed the *(type of product)* of *(project name and location)*. Notice is hereby given that an Agency Technical Review, appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the project's Review Plan. During the Agency Technical Review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, 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 Corps policy. The review also assessed the DQC documentation and made the determination that the DQC activities employed appear to be appropriate and effective. The Agency Technical Review was managed by *(RMO)*. All comments resulting from ATR have been resolved and the comments have been closed in DrCheckssm.

(Signature) (Date)
RMO representative

(Signature) (Date)
ATR Team Leader

(Signature) (Date)
Project Manager

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

(Describe the major technical concerns, possible impact, and resolution)

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

(Signature) (Date)
Chief, Engineering, Construction and Planning Division