



REPLY TO
ATTENTION OF

CENAD-RBT

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, US ARMY CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
BROOKLYN, NEW YORK 11252-6700

DEC 14 2012

MEMORANDUM FOR Commander, New England District, ATTN: CENAE-EP (Mr. Mackos),
696 Virginia Road, Concord, MA 01742-2751

SUBJECT: Review Plan Approval for Issue Evaluation Study Phase 1, Union Village Lake Dam,
VT (NID #VT00005)

1. References:

- a. E-Mail, CENAE-EP-WG (Ms. Papadopoulos), subject: CENAE District IESs Review Plans
- b. Memorandum, CEIWR-RMC, 30 Nov 12, subject: Risk Management Center Endorsement-Union Village Dam – IES Review Plan
- c. EC 1165-2-209, Change 1, Water Resources Policies and Authorities – Civil Works Review Policy, 31 Jan 12
- d. ER 1110-2-1156, Safety of Dams – Policy and Procedures, 28 Oct 11

2. The enclosed Review Plan for the Issue Evaluation Study Phase 1, Union Village Lake Dam, VT has been prepared in accordance with Reference 1.c. Issue Evaluation Studies (IES) for dams rated as Dam Safety Action Classification (DSAC) II, III and, IV are required by Reference 1.d, and are studies to determine the nature of a safety issue or concern, and the degree of urgency for action within the context of the entire USACE inventory of dams. The purpose of an IES is to focus on significant potential failure modes when evaluating risk, verify the current DSAC rating, guide the selection and gauge the effectiveness of interim risk reduction measures, and justify the need to pursue or not pursue Dam Safety Modification studies. Issue Evaluation Study results are used to assist dam safety officials with making risk informed decisions, and prioritize dam safety studies and investigations within the context of the entire USACE inventory of dams.

3. The Risk Management Center (RMC) is the Review Management Organization (RMO) for the Agency Technical Review (ATR). The RMC has reviewed the Review Plan and recommends MSC approval. An Independent External Peer Review (IEPR) is not required for IES reports.

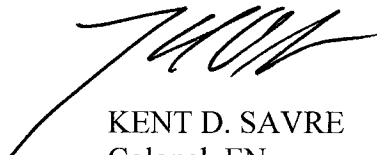
4. The enclosed Review Plan for Issue Evaluation Study Phase 1, Union Village Lake Dam, VT is approved. The Review Plan is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

SUBJECT: Review Plan Approval for Issue Evaluation Study Phase 1, Union Village Lake Dam, VT (NID #VT00005)

5. In accordance with Reference 1.b, Appendix B, Paragraph 5, this approved Review Plan shall be posted on your district website for public review and comment. The plan will also be posted on NAD's website for review and comment.

6. The Point of Contact for this action is Mr. Daniel Rodriguez, 347-370-4395 or Daniel.J.Rodriguez@usace.army.mil.

Encl
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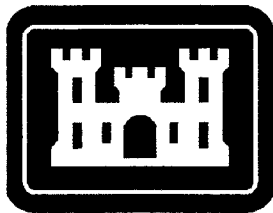


KENT D. SAVRE
Colonel, EN
Commanding

CF (w/ encl):
CEIWR-RMC (T. Bishop)
CENAE-EP-WG (A. Papadopoulos)
CENAE-WP-W (S. Michalak)
CENAD-PD-X (L. Cocchieri)

**Review Plan
U.S. Army Corps of Engineers
New England District
North Atlantic Division**

**Union Village Dam
Issue Evaluation Study
Phase 1**



**US Army Corps
of Engineers®**

27 November 2012

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Attachments

ATTACHMENT 1 – Completion of Agency Technical Review

ATTACHMENT 2 – Team Rosters

1. Introduction

a. Purpose

This Review Plan is intended to ensure a quality-engineering Dam Safety Issue Evaluation Study developed by the Corps of Engineers. ER 1110-2-1156, "Dam Safety Policy and Procedures" dated 28 Oct 2011, Chapter 8 describes the Issue Evaluation Study (IES) Plan development, review, and approval process. This Review Plan has been developed for Union Village Dam. This Review Plan was prepared in accordance with EC 1165-2-209, "Civil Works Review Policy", and covers the review process for the Union Village Dam Phase 1 IES Report. The IES is a study that may lead to additional studies, modeling, or NEPA consultation. NEPA compliance would occur during the Dam Safety Modification Study Phase. Because the Phase 1 IES is used to justify a Phase 2 Issue Evaluation Study and potentially Dam Safety Modification (DSM) studies, it is imperative that the vertical teaming efforts are proactive and well coordinated to assure collaboration of the report findings, conclusions, and recommendations, and that there is consensus at all levels of the organization with the recommended path forward.

b. Project Description and Information

Union Village Dam is a unit of the comprehensive plan for flood control and other purposes in the Connecticut River Basin. This project was authorized by the Flood Control Act approved 22 June 1936 (Public Law No. 738, 74th Congress) as amended by Public Laws No. 111 and 406-75th Congress, and the Flood Control Act approved 28 June 1938 (Public Law No. 761, 75th Congress) as modified by the Flood Control Act of 18 August 1941 (Public Law No. 228, 77th Congress). Construction of the project started in 1947, and it became operational in 1950. Total construction cost was \$4,095,160. As of December 2011, it has prevented an estimated \$56,642,000 in flood damages.

Union Village Dam is a flood control project located on the Ompompanoosuc River, four miles above its junction with the Connecticut River, in Thetford, Vermont. It is ¼ mile north of Union Village, and 11 miles north of White River Junction. It is the northernmost flood control reservoir in a system of 16 dams and reservoirs which were constructed in the Connecticut River Basin for flood control purposes. The operation of Union Village Dam and the other six reservoirs in the Upper Connecticut River Basin are coordinated to reduce flood stages of the downstream communities on the Ompompanoosuc River and along the main stem of the Connecticut River. The project provides flood protection for potential downstream damage in Vermont, New Hampshire, Massachusetts, and Connecticut. The reservoir has a drainage area of 126 square miles (see Figures on pages 5 and 6 below).

Union Village Dam is a rolled-earth embankment approximately 1,100 feet long with a maximum height of 170 feet above streambed. The embankment has a crest width of 30 feet, at elevation 584.0 NGVD. The embankment slopes both upstream and downstream are 1V:2.5H above Elevation 564 ft. NGVD and 1V:3H below this elevation. The dam embankment section consists of a central impervious core with a cutoff trench through the overburden to bedrock in the foundation and right (west) abutment; the left (east) abutment impervious core and shells are founded on bedrock. The core is flanked by random and pervious fill sections both upstream and downstream. The upstream slope is covered with 2 feet of gravel bedding and 6 feet (minimum) of dumped rock. The downstream slope is covered with 1 to 2 feet of gravel bedding and 2 feet (minimum) of dumped rock. A 12-foot thick horizontal drainage blanket is located along the base of the dam upstream and downstream of the impervious core. The outlet works are located on the left abutment and consist of an approach channel, intake structure, discharge conduit and discharge channel. The outlet conduit and gate house are founded on firm, but fractured schist. A chute spillway constructed in bedrock is located on the right abutment of the dam with the approach channel floor near El. 520 NGVD. The ogee-shaped spillway crest is 388 ft long at El. 564 NGVD. Spillway discharges flow into Avery Brook, then to the Ompompanoosuc River.

A preliminary screening-level risk analysis was performed as part of the FY 2009 Screening Portfolio Risk Assessment (SPRA). The primary concerns identified by SPRA included: 1) Embankment-Foundation, Seepage & Piping (Normal Pools, Probably Inadequate) due to cloudy water in the toe drain; 2) Embankment-Foundation, Seepage & Piping (Unusual and Extreme Pools, Inadequate) due to cloudy water in the toe drain; 3) Embankment-Foundation, Seepage & Piping (Extreme Pools, Probably Inadequate) due to tree root infiltration of the downstream toe trench; 4) Embankment-Erosion: Toe, Surface, and Crest (Extreme Pools, Probably Inadequate) due to 2.9 feet of freeboard and breakdown of downstream rock fill protection; 5) Embankment-Abutment Seepage & Piping (Extreme Pools, Probably Inadequate) due to sand and gravel glacial soils within the right abutment. The SPRA classified Union Village Dam as a DSAC II.

A Potential Failure Modes Analysis (PFMA) was conducted during the week of 16-20 May 2011. It was facilitated by the USACE Louisville District (LRL) Cadre and was conducted to identify the potential failure modes that were considered to be credible and significant. Of the 16 credible potential failure modes (PFM), five potential failure modes were identified as significant. The most recent version of the PFMA report is the January 2012 draft.

The New England District, along with the Louisville District Cadre, performed an initial Expert Opinion Elicitation (EOE) in July-August 2012, and a follow-up EOE is

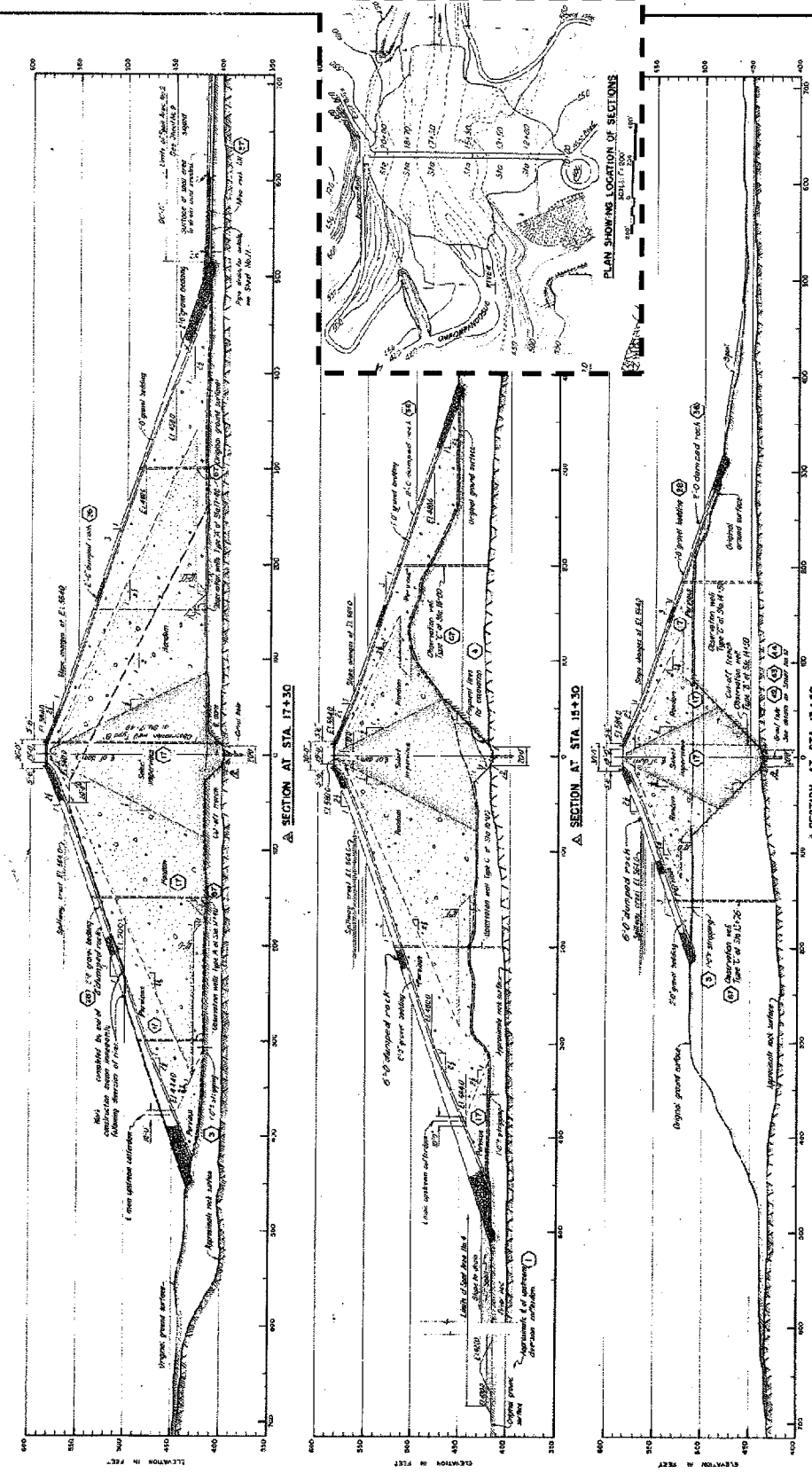
anticipated to take place in December 2012. Following the EOE completion, an Issue Evaluation Study (IES) report will be completed. The IES is not a decision document. It is a document that is used to present information that confirms the dam safety issues and supports the need for a dam safety modification study (DSMS), or states the case to revise the current Dam Safety Action Classification (DSAC) rating. There were five significant potential failure modes that were identified during the PFMA that were evaluated under the IES. Those failure modes included:

1. **PFM # 1 Backward Erosion and Piping of Foundation Soils at the End of the Right Embankment Beyond the Cutoff Excavation** – A continuous high permeability soil layer exists in the right abutment and is loaded with sufficient hydraulic gradient to initiate backward erosion and piping of glacial soils at an unfiltered exit point at the right abutment toe. Backward erosion and piping of glacial soil continues unfiltered and through soils which support a roof and the pipe progresses upstream towards the pool. Upstream materials fail to limit flow into the developing pipe, piping erosion continues, and gross enlargement occurs leading to instability of the embankment, full breach development, and uncontrolled release of the pool with associated downstream consequences.
2. **PFM #2 Backward Erosion and Piping of Embankment Soils at the End of the Right Embankment Through the Cutoff Trench** – A continuous poorly compacted zone exists in the impervious cutoff trench and connects to continuous upstream and downstream cohesionless soil layers in the right abutment. The pathway is loaded with sufficient hydraulic gradient to initiate backward erosion and piping of glacial soils at an unfiltered exit point at the right abutment toe. Backward erosion and piping of glacial and trench soils continues unfiltered and through soils which support a roof and the pipe progresses upstream towards the pool. Upstream materials fail to limit flow into the developing pipe, piping erosion continues, and gross enlargement occurs leading to instability of the embankment, full breach development, and uncontrolled release of the pool with associated downstream consequences.
3. **PFM #3 Internal Erosion of Embankment Soils into the Downstream Foundation Soils** – Continuous cohesionless soil layers exist upstream and downstream of the impervious core. The pathway is loaded with sufficient hydraulic gradient to initiate internal erosion of the core material into downstream glacial and alluvial soils. Eroded material continues to an unfiltered exit point at the downstream toe. Erosion of embankment soils continues unfiltered and through soils which support a roof, and the erosion progresses upstream towards the pool. Upstream materials fail to limit flow into the developing void, erosion continues, and sinkholes develop. Collapse of the embankment occurs, leading to breach development and uncontrolled release of the pool with associated downstream consequences.

4. **PFM #5 Backward Erosion and Piping of Foundation and Embankment Soils through a Compromised Toe Drain Pipe** – The downstream toe drain pipe is compromised due to separation or breakage. Continuous upstream and downstream alluvial and embankment soils are loaded with sufficient hydraulic gradient to initiate backward erosion and piping of embankment soils into the unfiltered compromised toe drain pipe. Backward erosion and piping of alluvial and embankment soils continues unfiltered and through soils which support a roof, and the pipe progresses upstream towards the pool. Upstream materials fail to limit flow into the developing pipe, piping erosion continues, and gross enlargement occurs leading to instability of the embankment, full breach development, and uncontrolled release of the pool with associated downstream consequences.

5. **PFM #6 Retrogressive Downstream Slope Failures due to a Compromised Toe Drain System** – The damaged toe drain system ceases to function as designed. Pore water pressures increase within the embankment and are not dissipated by the pervious or rock fill embankment zones. The available shearing resistance of the embankment materials falls below the shearing resistance required for equilibrium and slope failure occurs. Retrogressive slope failures continue to occur until the embankment crest is lowered enough to cause overtopping and uncontrolled release of the pool with associated downstream consequences.

The Union Village IES was placed into suspended status by the RMC in December 2011, and the IES was restarted in January 2012.



CONNECTICUT RIVER FLOOD CONTROL
UNION VILLAGE DAM
EMBANKMENT DETAILS NO. 2

UNIONVILLE, CONNECTICUT

U.S. ENGINEER OFFICE PROVIDENCE, R.I. JULY 1934

SCALE: 1" = 40' FT.

SHEET NO. 9

FILE NO. CT-1-860

NOTES

1. General notes apply to this sheet, see sheet No. 8 of this set.

2. For details of construction, see sheet No. 8 of this set.

3. See sheet No. 11.

4. See sheet No. 12.

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c. Levels of Review

IES Reviews shall include:

- District Quality Control (DQC)
- Agency Technical Review (ATR)

RMC Reviews shall include:

- Quality Control and Consistency Review (RMC staff and/or external experts)

Independent External Peer Review (IEPR) is applied in cases that meet certain criteria. This IES is not a decision document and does not cover work requiring a Type I or Type II IEPR. Issue Evaluation Studies are used to justify Dam Safety Modification Studies. If this project requires a Dam Safety Modification Study, both Type I and Type II IEPR will be conducted, as appropriate.

d. Review Team

Review Management Office: The USACE Risk Management Center (RMC) is the Review Management Organization (RMO) for dam safety related work, including this IES. Contents of this review plan have been coordinated with the RMC and the North Atlantic Division, the Major Subordinate Command (MSC). Informal coordination with NAD will occur throughout the IES development, including briefings to the NAD Dam Safety Committee and Program Review Board updates. In-Progress Review (IPR) team meetings with the RMC, NAD, and HQ will be scheduled on an “as needed” basis to discuss programmatic, policy, and technical matters. The NAD Dam Safety Program Manager will be the POC for vertical team coordination. This review plan will be updated for each new project phase.

Agency Technical Review Team:

Required ATR Team Expertise: The ATR team will be chosen based on each individual’s qualifications and experience with similar projects.

ATR Lead: The ATR team is a senior professional with extensive experience in preparing Civil Works documents and conducting ATRs (or ITRs). The lead has the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead should be a geotechnical engineer for Union Village Dam, and may also serve as a reviewer for his or her specific discipline.

Geotechnical Engineer - shall have experience in the field of geotechnical engineering, analysis, design, and construction of rolled earth fill dams. The geotechnical engineer shall have experience in subsurface investigations, rock and soil mechanics, internal erosion (seepage and piping), slope stability evaluations, erosion

protection design, and earthwork construction. The geotechnical engineer shall have knowledge and experience in the forensic investigation of seepage, settlement, stability, and deformation problems associated with high head dams and appurtenances constructed on rock and soil foundations.

Engineering Geologist - shall have experience in assessing internal erosion (seepage and piping) beneath rolled earth fill dams constructed on schistose bedrock formations. The engineering geologist shall be familiar with identification of geological hazards, exploration techniques, field and laboratory testing, and instrumentation. The engineering geologist shall be experienced in the design of grout curtains and must be knowledgeable in grout theology, concrete mix designs, and other materials used in foundation seepage barriers.

Hydraulic Engineer – shall have experience in the analysis and design of hydraulic structures related to dams including the design of hydraulic structures (e.g., spillways, outlet works, and stilling basins). The hydraulic engineer shall be knowledgeable and experienced with the routing of inflow hydrographs through multipurpose flood control reservoirs utilizing multiple discharge devices, Corps application of risk and uncertainty analyses in flood damage reduction studies, and standard Corps hydrologic and hydraulic computer models used in drawdown studies, dam break inundation studies, hydrologic modeling and analysis for dam safety investigations.

Mechanical Engineer – shall have experience in machine design, machine rehabilitation and familiarity with design of mechanical gates and controls for flood control structures.

Structural Engineer – shall have experience and be proficient in performing stability analysis, finite element analysis, seismic time history studies, and external stability analysis including foundations on high head mass concrete dams. The structural engineer shall have specialized experience in the design, construction and analysis of concrete dams.

Economist (or Consequence Specialist) – shall be knowledgeable of policies and guidelines of ER 1110-2-1156 as well as experienced in analyzing flood risk management projects in accordance with ER 1105-2-100, the Planning Guidance Notebook. The economist shall be knowledgeable and experienced with standard Corps computer models and techniques used to estimate population at risk, life loss, and economic damages.

2. Requirements

a. Reviews

The review of all work products will be in accordance with the requirements of EC 1165-2-209 by following the guidelines established within this review plan. All engineering and design products will undergo District Quality Control Reviews.

i. *District Quality Control (DQC)*

DQC is the review of basic science and engineering work products focused on fulfilling the project quality requirements. DQC will be performed for all district engineering products by staff not involved in the work and/or study. Basic quality control tools include a plan providing for seamless review, quality checks and reviews, supervisory reviews, Project Delivery Team (PDT) reviews, etc.

ii. *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 as a coherent whole. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists, 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 Major Subordinate Command (MSC).

iii. *Independent External Peer Review (IEPR)*

IEPR is the most independent level of review, and is applied in cases that meet certain criteria. This IES is not a decision document and does not cover work requiring a Type I or Type II IEPR. Issue Evaluation Studies are used to justify Dam Safety Modification Studies. If this project requires a Dam Safety Modification Study, both Type I and Type II IEPR will be conducted.

iv. *Policy and Legal Compliance Review*

Policy and Legal Compliance Review is required for decision documents. Since this IES is not a decision document it does not require a Policy and Legal Compliance Review. If this project requires a Dam Safety Modification Study, a Policy and Legal Compliance Review will be conducted.

v. *Peer Review of Sponsor In-Kind Contributions*

There will be no in-kind contributions for this IES.

b. Approvals

i. Review Plan Approval and Updates

The MSC for this IES is the North Atlantic Division. The MSC Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving the New England District, MSC, RMC and HQUSACE members) as to the appropriate scope and level of review for the study and endorsement by the RMC. Like the PMP, the Review Plan is a living document and may change as the study progresses. The 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 an Attachment to this plan. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-endorsed by the RMC and 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, will be posted on the District's webpage and linked to the HQUSACE webpage.

ii. IES Report

The IES Report shall undergo a DQC and formal ATR. After the ATR, the PDT will present the IES to the Quality Control and Consistency (QCC) Panel for review. The district and the risk assessment cadre present the IES risk assessment, IES findings, conclusions, and recommendations for review. After the QCC meeting, the Risk Cadre and RMC will certify that the risk estimate was completed in accordance with the Corps' current guidelines and risk management best practices. The IES will then be presented to the Senior Oversight Group (SOG). The SOG generally consists of the following members: Special Assistant for Dam Safety (Chair); CoP & Regional Representatives to include Geotechnical and Materials CoP Leader, Structural CoP Leader, and Hydraulics and Hydrologic CoP Leader; Regional representatives determined by Special Assistant for Dam Safety; Corps Business Line & Program Representatives to include DSPM, Flood Damage Reduction, Navigation, Programs, and Director, Risk Management Center; and any other Representatives determined by the Special Assistant for Dam Safety. The District Dam Safety Officer (DSO), the MSC DSO, and the SOG Chairman will jointly approve the final IES after all comments are resolved.

3. Guidance and Policy References

- ER 5-1-11, USACE Business Process
- EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010
- ER 1110-2-1156, Safety of Dams – Policy and Procedure, 28 Oct 2011
- ER 1110-1-12, Quality Management, 31 Mar 2011

4. Summary of Required Levels of Review

The dam safety program follows the policy review process described in EC1165-2-209, Civil Works Review Policy. The RMC will be the review management office for the ATR, and the RMC must certify that the risk assessment was completed in accordance with the USACE current guidelines and best risk management practices. A QCC review will be conducted including the district, MSC, and RMC. The district and the risk assessment cadre will present the IES risk assessment, IES findings, conclusions, and recommendations for review. After resolution of QCC review comments, the MSC and HQUSACE will complete quality assurance and policy compliance review.

5. Models

a. General

The use of certified or approved models for all planning activities is required by EC 1105-2-407. The EC defines planning models as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives, and to support decision-making. The EC does not cover engineering models. Engineering software is being addressed under the Engineering and Construction (E&C) Science and Engineering Technology (SET) initiative. Until an appropriate process that documents the quality of commonly used engineering software is developed through the SET initiative, engineering type models will not be reviewed for certification and approval. 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.

b. List

Model	Status
N/A - Planning Models Not Used	

6. Review Schedule

Project Phase / Submittal	Review Start*	Review Complete
DQC Review	25-Feb-2013	05-Apr-2013
ATR Review	08-Apr-2013	03-May-2013
Report Revisions and Back check	06-May-2013	17-May-2013
Submit Report to QCC	20-May-2013	
QCC Review	20-May-2013	21-Jun-2013
Report Revisions	24-Jun-2013	12-Jul-2013
Submit Report to SOG	15-Jul-2013	
SOG Review	15-Jul-2013	16-Aug-2013
Report Revisions	19-Aug-2013	27-Sep-2013

*Note schedule is dependent upon the actual EOE and completion of the report by all parties

7. Public Participation

Public participation will not take place until the IES phase is completed. Public and stakeholder coordination has been performed to inform interested parties about the DSAC 2 rating and ongoing IES. Findings of the Final IES will also be shared with appropriate stakeholders. If this project results in a Dam Safety Modification Study (DSMS), future public coordination will occur for NEPA compliance.

8. Cost Estimate

Task Description	Review Start	Review Cost
DQC Review	25-Feb-2013	\$45,500
ATR Review	08-Apr-2013	\$50,500
QCC Review	20-May-2013	\$50,000
SOG Review	15-Jul-2013	\$60,000

9. Execution Plan

a. District Quality Control

i. General

DQC will be conducted after completion of the final draft IES. DQC requires both supervisory oversight and District technical experts. The district will conduct a robust DQC in accordance with EC 1165-2-209, Civil Works Review Policy, the District's Quality Management Plan, and ER 1110-2-12, Quality Management. Documentation of DQC activities is required and will be in accordance with the District and MSC Quality manuals.. Comments and responses from DQC will be available for the ATR team to review through ProjNet DrChecks.

ii. DQC Review and Control

The District DSAC Project Manager will schedule DQC review meetings. The in progress review meetings should include PDT members from Geotechnical, Hydrology & Hydraulics, Structures, Mechanical, General Engineering, Cost Engineering, Project Management, Planning, and Operations as applicable. DQC Review will be conducted on the completed final draft IES including all Sections and Appendixes and will include comments, back check and IES revisions. ProjNet DrChecks review software will be used to document reviewer comments, responses and associated resolutions. Comments should be limited to those that are required to ensure the adequacy of the product.

b. Agency Technical Review

i. General

Draft ER 1110-2-1156, Chapter 8 describes the purpose, process, roles and responsibilities for an IES in addition to the submittal, review, and approval process. The Risk Management Center (RMC) is responsible for coordinating and managing agency technical review of the IES Report in accordance with EC 1165-2-209. The ATR Lead will be an RMC team member unless otherwise approved by the RMC Director. The ATR Lead in cooperation with the PDT, MSC, and vertical team will determine the final make-up of the ATR team.

ii. ATR Review and Control

Reviews will be conducted in a fashion which promotes dialogue regarding the quality and adequacy of the IES and baseline risk assessment necessary to achieve the purposes of the IES. The ATR team will review the IES report which includes supporting risk and stability analysis documentation. A QCC of the baseline risk estimate and supporting documentation will be performed under the leadership of the RMC. Therefore, the level of effort for each ATR reviewer is expected to be between 16 and 32 hours. DrChecks review software will be used to document reviewer comments, responses and associated resolutions. Comments should be limited to those that are required to ensure the adequacy of the product. The RMC in conjunction with the MSC, will prepare the charge to the reviewers, containing instructions regarding the objective of the review and the specific advice sought. A kick off meeting will be held with the ATR team to familiarize reviewers with the details of the project.

The four key parts of a 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.
- (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 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 also:

- (1) Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer.
- (2) Include the charge to the reviewers prepared by the RMC in accordance with EC 1165-2-209, 7c.
- (3) Describe the nature of their review and their findings and conclusions.
- (4) 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. Certification of ATR should be completed, based on work reviewed to date, for the final report. A draft certification is included in Attachment 1.

10. Review Plan Points of Contact

Name/Title	Organization	Email/Phone
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Daniel Rodriguez/ NAD Dam Safety Program Manager	CENAD-RB-T	daniel.j.rodriguez@usace.army.mil
Dave Carlson/ Program Manager Eastern Division	CEIWR-RMC	david.e.carlson@usace.army.mil
Tom Bishop / Review Manager	CEIWR-RMC	thomas.w.bishop@usace.army.mil

ATTACHMENT 1

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *Issue Evaluation Study* for *Union Village Dam, Thetford, VT*. 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.

TBD
ATR Team Leader
Office Symbol/Company

Date

TBD
Project Manager
Office Symbol

Date

NATHAN SNORTELAND, P.E.
Director, Risk Management Center
CEIWR-RMC

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.

ANTHONY T. MACKOS, P.E.
Chief, Engineering Division
CENAE-EP

Date

SCOTT C. MICHALAK, P.E.
Dam Safety Officer¹
CENAE-EP-W

Date

¹ Only needed if different from the Chief, Engineering Division.

ATTACHMENT 2: TEAM ROSTERS

NAE PROJECT DELIVERY TEAM (PDT)

Name/Title	Section	Email/Phone
William Lawrence / Geotechnical Engineer	Project Manager/Geotechnical Engineering	William.T.Lawrence@usace.army.mil 978-318-8786
Anastasia Papadopoulos / Geotechnical Engineer	Lead Engineer/Geotechnical Engineering	Anastasia.S.Papadopoulos@usace.army.mil 978-318-8107
Thom Davidson /Geologist	Geology and Chemistry	Thomas.A.Davidson@usace.army.mil 978-318-8572
Mike Boiardi /Geologist	Geology and Chemistry	Michael.Boiardi@usace.army.mil 978-318-8646
Patrick Blumeris /Hydrologic Engineer	Water Management	Patrick.M.Blumeris@usace.army.mil 978-318-8737
Deborah Gabrielson /Mechanical Engineer	Civil Engineering	William.T.Lawrence@usace.army.mil 978-318-8786 (DG has retired.)
Dave Descoteaux /Structural Engineer	Civil Engineering	David.R.Descoteaux@usace.army.mil 978-318-8083
Denise Kammerer-Cody /Economist	Economic and Cultural Resources	Denise.E.Kammerer- Cody@usace.army.mil 978-318-8105
Heather Morse /Park Manager	Operations Division	Heather.L.Morse@usace.army.mil 978-318-8469

LRL RISK CADRE

Name/Title	Role	Email/Phone
Bart Best /Geotechnical Engineer	Cadre Lead	Bart.B.Best@usace.army.mil 502-315-6469
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Chun-Yi Kuo /Geotechnical Engineer	Geotechnical	Chun-Yi.Kuo@usace.army.mil 502-315-6514
Troy O'Neal /Geotechnical Engineer	Geotechnical	Troy.S.ONeal@usace.army.mil 502-315-6447
David Robison /Geologist	Geologist	David.M.Robison@usace.army.mil 502-315-3214
Gabriela Lyvers /Structural Engineer	Structural	Gabriela.M.Lyvers@usace.army.mil 502-315-6471
Adam Connelly /H&H Engineer	H&H and MMC	Adam.M.Connelly@usace.army.mil 502-315-6364
Alex Ryan	Economics	Alex.Ryan@usace.army.mil

/ Economist		502-315-6866
Mark Robertson /Mechanical	Mechanical	Mark.A.Robertson@usace.army.mil 502-315-6264
Kevin Richards /Senior Advisor	RMC	Kevin.S.Richards@usace.army.mil 303-241-8380
Chris Hogan /Technical Advisor	RMC	Christopher.J.Hogan@usace.army.mil 502-315-7449

DISTRICT QUALITY CONTROL TEAM

Discipline	Phone	Years of Experience	Credentials
Anastasia Papadopoulos /Lead DQC	978-318-8107	20+	P.E.
Erik Matthews /Geotechnical Engineer	978-318-8365	20+	P.E.
Rosemary Schmidt /Geologist	978-318-8345	20+	P.G.
Townsend Barker /Hydrology/Hydraulics	978-318-8621	30+	P.E.
Karen Umbrell /Economics	978-318-8140	20+	

AGENCY TECHNICAL REVIEW TEAM*

**To Be Determined*

Discipline	Phone	Years of Experience	Credentials
/ATR Lead/Geotechnical Engineer			
/Hydrology/Hydraulics Engineer			
/Engineering Geologist			
/ Economist/Consequences			

QCC Review Team to Be Determined at a later date