



DEPARTMENT OF THE ARMY
PACIFIC OCEAN DIVISION, U.S. ARMY CORPS OF ENGINEERS
FORT SHAFTER, HAWAII 96858-5440

31 DEC 2014

CEPOD-PDC

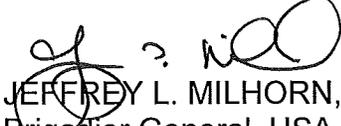
MEMORANDUM FOR COMMANDER ALASKA ENGINEER DISTRICT (CEPOA-PM-C-PL/JASON NORRIS), P.O. BOX 6898, JBER, AK 99506-0898

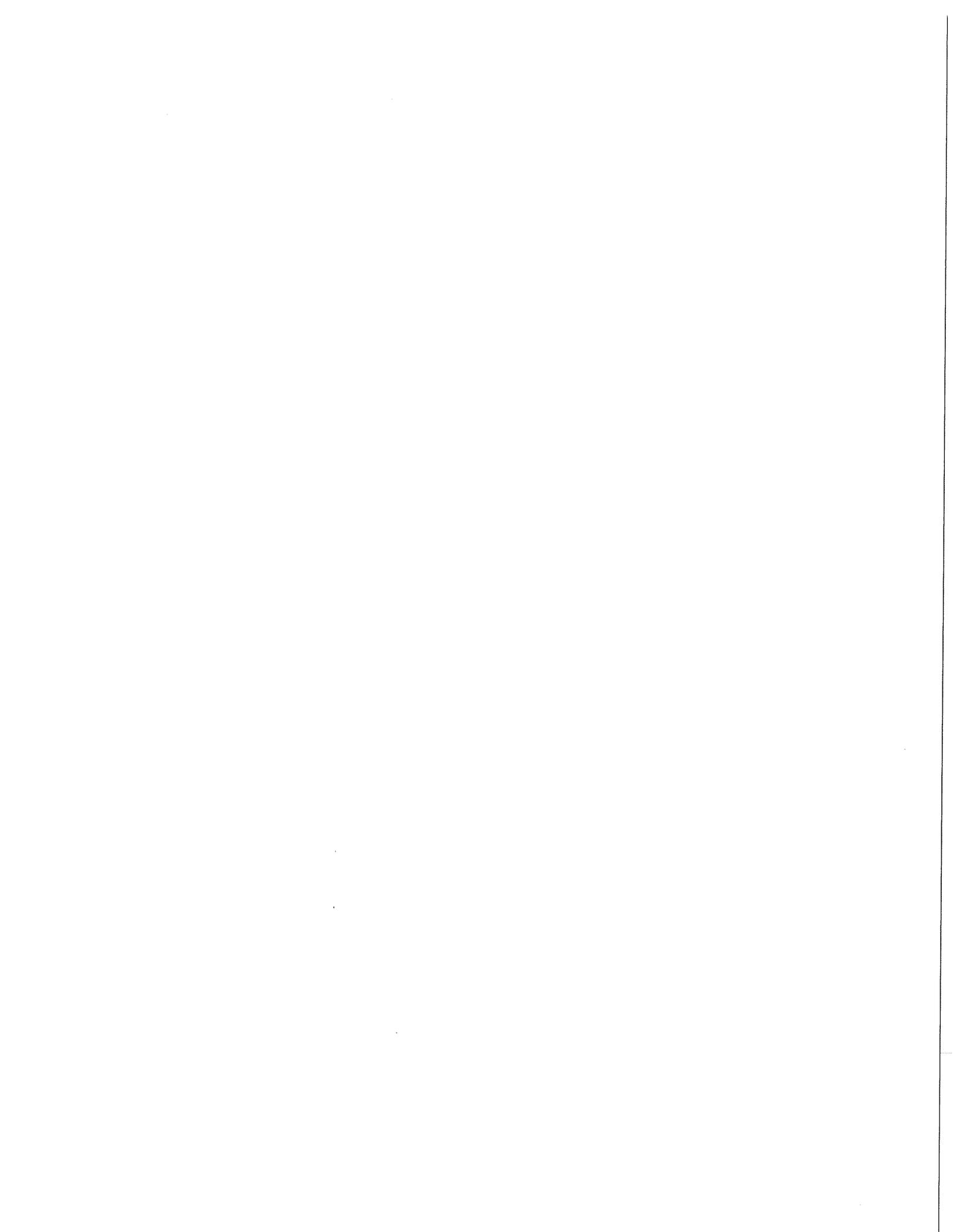
SUBJECT: Review Plan Approval for the Moose Creek Dam Safety Modification Study, North Pole, AK.

1. References:

- a. Engineer Circular 1165-2-214, Civil Works Review, 15 December 2012.
 - b. Review Plan for the Moose Creek Dam Safety Modification Study, Alaska District, U.S. Army Corps of Engineers.
2. This memorandum constitutes approval of the Moose Creek Dam Safety Modification Study, Alaska District, U.S. Army Corps of Engineers, Review Plan, which includes a Type I Independent External Peer Review.
3. The approved Review Plan is subject to change as circumstances require, consistent with project development under the Project Management Business Process. Subsequent significant revision to this Review Plan requires my written approval.
4. For further information or clarification about the review process, please contact the U.S. Army Corps of Engineers Risk Management Center at 304-399-5217.
5. POC is Mr. Russell Iwamura, Senior Economist, Civil Works Integration Division, at 808-835-4625 or email Russell.K.Iwamura@usace.army.mil.

Encl


JEFFREY L. MILHORN, P.E.
Brigadier General, USA
Commanding



REVIEW PLAN

FOR

**MOOSE CREEK
DAM SAFETY MODIFICATION STUDY**

NORTH POLE, ALASKA

ALASKA DISTRICT

P2 Number: 336876

**Plan Date: 1 December 2014
MSC Approval Date: 31 December 2014
Last Revision Date: None**



**US Army Corps
of Engineers ®**

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REVIEW PLAN
MOOSE CREEK
DAM SAFETY MODIFICATION STUDY

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1. PURPOSE AND REQUIREMENTS

a. Purpose. This Review Plan defines the scope and level of peer review for the Moose Creek Dam Safety Modification Study (DSMS) and Environmental Assessment (EA).

This Review Plan was developed using the Pacific Ocean Division (POD) version of the U.S. Army Corps of Engineers (USACE) National Planning Center of Expertise (PCX) Review Plan template dated 1 November 2012.

b. References

- (1) Engineer Circular (EC) 1165-2-214, Civil Works Review, 15 December 2012.
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 March 2011.
- (3) ER 1105-2-100, Planning Guidance Notebook, 20 November 2007.
- (4) Moose Creek Dam Safety Modification Study Project Management Plan, 24 November 2014.
- (5) Pacific Ocean Division, POD Quality Management Plan, October 2013.
- (6) CEPOA-CW-6.1-2-WI-01, District Quality Control of Civil Works Decision Documents, April 2014.
- (7) Alaska District Quality Management Plan, CEPOA-QMP-001, January 2010.
- (8) ER 1110-2-1156, Safety of Dams – Policy and Procedure, 31 March 2014.
- (9) Army Regulation 15-1, Committee Management, 27 November 1992 (Federal Advisory Committee Act Requirements).
- (10) National Academy of Sciences, Background Information and Confidential Conflict of Interest Disclosure, (BI/COI) FORM 3, May 2003.
- (11) ER 1110-1-8159, Engineering and Design, DrChecks, 10 May 2011.
- (12) ER 415-1-11, Biddability, Constructability, Operability, Environmental, and Sustainability (BCOES) Review, 1 January 2013.
- (13) ER 415-1-13, Design and Construction Evaluation (DCS), 29 February 1996.
- (14) ER 200-2-2, Procedures for Implementing NEPA, 4 March 1988.

- (15) ER 11-1-321, Value Engineering, 28 February 2005.
- (16) ER 1110-2-1302, Civil Works Cost Engineering, 15 September 2008.
- (17) ER 1110-2-1806, Earthquake Design and Evaluation for Civil Works Projects, 31 July 1995.
- (18) ER 1110-2-1942, Inspection, Monitoring, and Maintenance of Relief Wells, 29 February 1988.
- (19) Engineer Manual (EM) 1110-2-1411, Standard Project Flood Determinations, 1 March 1965.
- (20) EM 1110-2-1420, Hydraulic Engineering Requirements for Reservoirs, 31 October 1997.
- (21) EM 1110-2-6054, Inspection, Evaluation, and Repair of Hydraulic Steel Structures, 1 December 2001.
- (22) Engineer Pamphlet (EP) 1165-2-1, Digest of Water Resources Policies and Authorities, 30 July 1999.
- (23) Documentation of screening for Moose Creek Dam, 16 June 2009.
- (24) ER 5-1-11, Management USACE Business Practices, 1 November 2006.
- (25) ER 1110-1-12, Engineering and Design Quality Management, Change 2, 31 March 2011.
- (26) ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 August 1999.
- (27) Moose Creek Dam Safety Modification Study Project Management Plan.

c. 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 outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review (IEPR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214) and planning model certification/approval (per EC 1105-2-412) and the Value Management Plan requirements in the Project Management Business Process Reference 8023G and ER 11-1-321, Change 1.

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 decision documents is typically either a Planning Center of Expertise (PCX), Mandatory Center of Expertise (MCX), or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is the RMC.

Levels of review for this study shall include:

- DQC.
- ATR.
- Quality Control and Consistency Review (QCC), lead by RMC staff and/or external experts.

The RMC, as the RMO, will coordinate with the Civil Works Cost Engineering and ATR Mandatory Center of Expertise (MCX) to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. The MCX will coordinate with the RMC on review matters.

3. STUDY INFORMATION

a. Authority. The Chena River Lakes Flood Control Project was authorized by the Flood Control Act of 13 August 1968, Public Law (PL) 90-483, Section 208, 90th Congress (S-3710), in accordance with the recommendations of the Chief of Engineers in Senate Document No. 89, 90th Congress.

b. Decision Document. The decision document for this project is the Moose Creek DSMS and National Environmental Policy Act Document with Appendices. The purpose of the document is to provide planning, engineering, and implementation details of the recommended plan to proceed to the Preconstruction, Engineering and Design Phase. At this time, it is anticipated that the required National Environmental Policy Act documentation is an Environmental Assessment. Consistent with National Environmental Policy Act, a resulting decision of the Environmental Assessment is that an Environmental Impact Statement may be required. If the National Environmental Policy Act documentation requirements change, the Review Plan will be updated accordingly.

c. Study/Project Description. Moose Creek Dam, the main component of the Chena River Lakes Flood Control Project, is located 17 miles east of Fairbanks, Alaska near the town of North Pole. Moose Creek Dam is approximately 7.4-mile-long earthfill structure that functions as a dry dam and provides flood control for the downstream communities of North Pole, Fairbanks, and Fort Wainwright, Alaska. Construction was initiated in 1973 and completed in 1979, although the dam did not retain floodwaters until 1981. The pool of record, equivalent to a 40-year design storm occurred in 1992.

d. Risk Based Dam Safety Process. In 2009, Moose Creek Dam was evaluated by a Screening Portfolio Risk Assessment Cadre and ultimately given a Dam Safety Action Classification (DSAC) of I, (Urgent and Compelling). The DSAC I rating was primarily due to seepage and piping in the foundation. The other identified failure modes were the control works stability under seismic loading, and foundation liquefaction under seismic loading. In addition, the structure has only been loaded to a 40-year event. The Interim Risk Reduction Measures Plan (IRRMP) was approved in November 2009.

A Baseline Risk Assessment was prepared and submitted to the Senior Oversight Group (SOG) in January 2014. The Baseline Risk Assessment Risk Cadre identified 3 significant potential failure modes that were believed to be the primary risk drivers.

- i. Backward erosion & piping with vertical exit (heave) adjacent to permafrost zones below the downstream stability blanket.
- ii. Backwards erosion and piping with horizontal exit in the South Seepage Collection channel or old Chena Channel.
- iii. Scour along the base of the silty core from high flows through layers of open work gravel with horizontal exit in the South Seepage Collection Channel or old Chena Channel.

The potential failure modes were best correlated by performance and site conditions to locations near the central embankment area near the low point drainage structure. The risk assessment concluded that the boils observed during the high water events were limited to movement of the natural silt blanket and the exit gradients were insufficient to begin backwards erosion and piping of the sand and gravel foundation matrix.

The SOG re-characterized the Moose Creek Dam as a DSAC 3 (Moderate Urgency) in May 2014 and directed the completion of a Dam Safety Modification Study.

Based on the information presented in the Risk Assessment Report and briefing, the Dam Senior Oversight Group (DSOG) was concerned that the risk cadre did not adequately address potential failure modes that may exist due to the discrete boring locations along a highly variable 39,100-foot long alluvial foundation. The DSOG believe the silt and finer sand layers may potentially be more extensive than the foundation data portrayed. Therefore, the risk assessment may have significantly underestimated the probability that failure could progress through the foundation from backwards erosion and piping failure modes.

The DSOG concluded that the total incremental risk posed by the dam under all loading cases was most likely higher than presented in the risk assessment report due to the difficulties in characterizing data uncertainties and unknowns into representative sections that can be quantitatively analyzed. However, the SOG also acknowledged that additional data collection, analysis, or elicitation was unlikely to reduce the high degree of uncertainty. Therefore, the DSOG accepted the risk assessment in its current

form with an understanding that the risks presented to SOG likely underestimated the risk for internal erosion in the foundation due to a potential flaw near the embankment-foundation contact.

Below is the list of recommendations from the DSOG:

Table 1:. DSOG Recommendations

Recommendation	Action	Responsibility
2014-AK00085-DS-01	Complete a dam safety modification study to address failure modes in the foundation of Moose Creek Dam.	CEPOA-EN
2014-AK00085-DS-02	Complete an Environmental Assessment to make lowering the floodway control weir Interim Risk Reduction Measure (IRRM) a permanent dam safety action.	CEPOA
2014-AK00085-DS-03	Re-Evaluate the risks posed by failure modes in the foundation as part of the dam safety modification study.	CEIWR-RMC
2014-AK00085-DS-04	Change dam's risk characterization to DSAC 3 in Dam Safety Project Management Tool (DSPMT).	CEPOA
2014-AK00085-OM-01	Develop a comprehensive Dam Safety Monitoring plan.	CEPOA
2014-AK00085-OM-02	Develop a comprehensive Consequence management plan.	CEPOA
2014-AK00085-OM-01	Evaluate installing additional relief wells in areas with high uplift pressure as additional IRRMs	CEPOA
2014-AK00085-OM-02	Improve seepage monitoring and collection systems as additional IRRMs.	CEPOA

e. Detailed Milestone Schedule and Budget.

Table 2. Detailed Milestone Schedule

Activity Name	Start Date	End Date
<u>Program/Project Management</u>		
Program Management and Oversight -District/Cadre/PCX -Labor	Feb 2014	Sep 2017
Develop DSM Review Plan	Jun 2014	Nov 2014
Develop DSM Project Management Plan	Jun 2014	Nov 2014
Kickoff Meeting	Jun 2014	Nov 2014
<u>Future Without Action Condition</u>		
FWAC/Existing Condition Risk Assessment Formulation (FY15)	Aug 2014	Mar 2015
Length Effects Evaluation	Aug 2014	Mar 2015
FWAC/Existing Condition Risk Assessment DQC (FY15)	Apr 2015	Apr 2015
FWAC/Existing Condition Risk Assessment ATR (FY15)	May 2015	May 2015
FWAC/Existing Condition Risk Assessment Brief (FY15)	Jun 2015	Jun 2015
<u>Draft DSM Report</u>		
IRRMP Revision	Aug 2014	Feb 2015
AAR Report	Aug 2014	Feb 2015
Risk Management Measures Scoping -Labor (FY15)	Jan 2015	Mar 2015
Risk Management Measures Scoping -Travel (FY15)	Feb 2015	Feb 2015
Risk Management Measures Vertical Team Webinar (FY15)	Mar 2015	Mar 2015
Value Engineering Study (FY15)	Mar 2015	Apr 2015
Formulate Alternative Risk Management Plans (FY15)	Feb 2015	May 2015
Constructability Evaluation 1 – Alternative Assessment	Apr 2015	Apr 2015
Formulate Alternative Risk Management Plans Webinar (FY15)	May 2015	May 2015
Evaluate Alternative Risk Management Plans (FY15)	May 2015	Jun 2015
Alternative Risk Management Plan Evaluation Meeting at POA (FY15)	Jul 2015	Jul 2015
Constructability Evaluation 2 – Alternative Development	Aug 2015	Aug 2015
Compare Alternative Risk Management Plans (FY15)	Jul 2015	Sep 2015
Alternative Risk Management Plan Comparison Webinar (FY15)	Sep 2015	Sep 2015
Tentatively Select Risk Management Plan -Labor (FY16)	Oct 2015	Dec 2015
Tentatively Select Risk Management Plan Meeting -Labor (FY16)	Dec 2015	Dec 2015

Activity Name	Start Date	End Date
Real Estate Plan with Work Limit Requirements (FY16)	Jan 2016	Sep 2016
Preliminary Design and Quantity Estimate for Recommended Plan (FY16)	Jan 2016	Sep 2016
Prepare MCACES Cost and Schedule Risk Assessment (FY16)	Jan 2016	Sep 2016
Prepare Draft Dam Safety Modification Report and Appendices - Labor (FY16)	Jan 2016	Sep 2016
NEPA EA/EIS		
District Issues Notice of Intent (FY15)	Oct 2014	Mar 2015
District NEPA Public Meetings and Agency/Coordination Meetings (FY15)	Oct 2014	Sep 2015
Prepare NEPA Document FY15	Oct 2014	Dec 2016
Notice of Availability in Federal Register - Start (FY17)	Jan 2017	Jun 2017
Draft NEPA Document for Public Comment (FY17)	Jun 2017	Aug 2017
Notice of Availability in Federal Register - Final Doc (FY17)	Aug 2017	Aug 2017
Notice of Availability in Federal Register - Start (FY16)	Jan 2017	Jun 2017
Draft NEPA Document for Public Comment (FY16)	Jun 2017	Aug 2017
Notice of Availability in Federal Register - Final Doc (FY16)	Aug 2017	Aug 2017
Draft DSM Review/Final Report (FY17)		
RMC Technical Expert Support and Review	Feb 2014	Sep 2017
Draft DSMR - DQC Review	Nov 2016	Dec 2016
Draft DSMR - ATR Review	Jan 2017	Feb 2017
Draft DSMR - QCC Review	Mar 2017	Apr 2017
Draft DSMR - SOG Review -Labor	May 2017	May 2017
IEPR Type I Decision Document Review	May 2017	May 2017
IEPR Type I Decision Document Contract	Jun 2017	Jul 2017
Final Report Complete	May 2017	Aug 2017
NEPA Approval FONSI/ROD	Aug 2017	Aug 2017
District DSO, MSC, DSO, SOG sign Joint Memo approval	Aug 2017	Aug 2017
DSOG Endorsement of DMS Report	Aug 2017	Aug 2017
USACE DSO Approval of DSMR, HQUACE signs EIS/SEIS ROD	Sep 2017	Sep 2017
USACE DSO Approval of DSM Report	Sep 2017	Sep 2017
Notify ASACW, USADCE CDR, MSC CDR	Sep 2017	Sep 2017

Activity Name	Start Date	End Date
ASACW Concurrence	Sep 2017	Sep 2017

Table 3. Budget by Team and Fiscal Year.
(\$000)

	<u>FY15</u>	<u>FY16</u>	<u>FY17</u>
RMC	\$ 146	\$ 146	\$ 146
Cadre	\$ 408	\$171	\$160
MMC	\$ 53	\$25	\$25
DSPC - Omaha	\$ 284	\$268	\$268
PDT – Alaska District	\$1,157	\$845	\$247
ATR	\$ 80	\$80	\$100
Totals	\$2,127	\$1,535	\$946

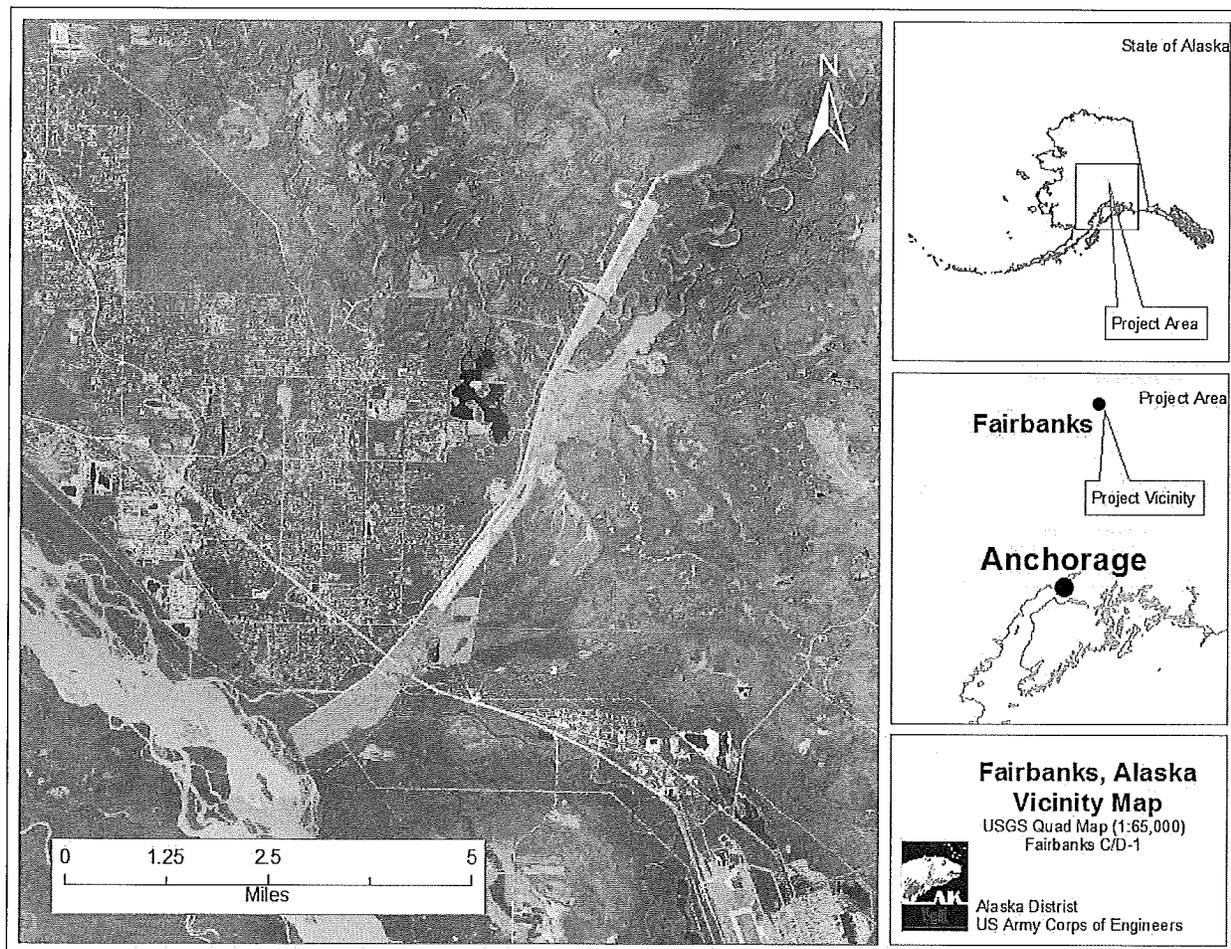


Figure 1: Project Area

f. Factors Affecting the Scope and Level of Review.

- This project will likely be justified by life safety as non-performance of the project could pose a significant threat to human/life safety and carries with it significant residual risk.
- The information in the decision document will likely not:
 - Be based on novel methods,
 - Involve the use of innovative materials or techniques,
 - Present complex challenges for implementation,
 - Contain precedent-setting methods or models,
 - Present conclusions that are likely to change prevailing practices.
- The project report is not likely to contain influential scientific information or be a highly influential scientific assessment.
- There is no request by the Governor of the State of Alaska or the head of a Federal of State agency for a peer review by independent experts.
- There is unlikely to be significant public dispute over the project's size, nature, or effects.
- Currently, it is assumed that the project will cost more than \$10 million and therefore Value Engineering will be required during the feasibility and design phases.
- Currently, it is assumed that the project will cost less than \$200 million.

g. In-Kind Contributions. Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. There are no anticipated in-kind contributions for this study.

4. DISTRICT QUALITY CONTROL (DQC)

All decision 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). POA shall manage DQC. Completion and documentation of DQC activities is required and should be in accordance with CEPOA-CW-6.1-2-WI-01 and the POD Quality Manual. DQC shall be conducted informally on an ongoing basis throughout the accomplishment of work tasks. Formal DQC will take place when drafts of the main document and appendices have been completed. The formal DQC process includes three layers of review including: PDT review, editorial review, and peer/supervisor review.

The initial review (PDT review) entails a team-reading of the document to ensure document coherence, integrity, and quality. The editorial review will be conducted by the POA technical editor or a person of equal technical skill. The peer/supervisor review will be conducted by the functional Chiefs of each section or their designees. Designees shall have a level of skill sufficient to ensure a quality review. The PM shall be responsible for ensuring schedule, scope, and funding are sufficient for executing DQC. The Lead Planner will coordinate and document DQC in accordance with this Review Plan.

a. Documentation of DQC. DrChecks™ review software will be used throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product.

b. Products to Undergo DQC. All decision documents, including cost estimates are to be prepared in accordance with the POA Quality Management Plan and will undergo DQC.

c. Required DQC Expertise. The following expertise is needed for DQC. Once identified, the DQC team members for this study and a brief description of their credentials will be added in Attachment 1.

Table 4: DQC Expertise

DQC Team Members/Disciplines	Expertise Required
DQC Lead	The DQC lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting DQC. The lead should also have the necessary skills and experience to lead a team through the DQC process. The DQC lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	The Planning reviewer should be a senior water resources planner with experience in preparation of decision documents related to flood risk management studies
Economics	The Economics reviewer should be a senior economist with experience in quantifying benefits related to flood risk management studies.
Environmental Resources	The Environmental Resources reviewer should be a senior professional with NEPA experience. The Environmental Resources reviewer will also act as the Cultural/Historical Resources reviewer. The Environmental Resources reviewer may choose to delegate the Cultural/Historical Resources review to a professional with equal or greater experience in Section 106 National Historic Preservation Act (NHPA) consultation and other relevant laws, guidance, and policies as they relate to Cultural/Historical Resources.
Hydraulic Engineering	The Hydraulic Engineering reviewer should be a senior,

	registered engineer with experience in the design of flood risk management structures.
Geotechnical Engineering	The Geotechnical Engineering reviewer should be a senior, registered engineer with experience in geotechnical analyses as they pertain to the construction of flood risk management measures.
Cost Engineering	The Cost Engineering reviewer should be familiar with cost engineering of flood risk management measures using the Microcomputer Aided Cost Engineering System (MCACES) model and preparation of 2 nd Generation (MII) Cost estimates. The reviewer should be a certified cost technician, consultant, or engineer.
Real Estate	The real estate reviewer should have experience in the application of real estate law and Federal policies and guidance in the application thereof.

5. AGENCY TECHNICAL REVIEW (ATR)

ATR is mandatory for all decision 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 is managed within USACE by RMC and is conducted by a qualified team from outside POA 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 POD. Due to prior vertical team engagement and site visits, an ATR-specific site visit is not anticipated at this time.

a. Products to Undergo ATR. ATR will be performed throughout the study in accordance with POA and POD Quality Management Plans. The ATR shall be documented and discussed at the appropriate milestones commensurate with the DSMS process. Certification of the ATR will be provided prior to the District Commander signing the final report. Products to undergo ATR include the Moose Creek DSMS and EA, and associated appendices.

b. Required ATR Team Expertise. The following ATR expertise is required for this project. Where possible ATR team members will address multiple disciplines and emphasis. The RMC, as the RMO, will identify the final make-up of the ATR team and identify the ATR team lead in coordination with the Project Manager (PM), vertical team, and other appropriate centers of expertise. Once identified, the ATR team members for this study and a brief description of their credentials will be added in Attachment 1.

Table 5: ATR Required Expertise

ATR Team Members/Disciplines	Expertise Required
ATR Lead	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc).
Planning	The Planning reviewer should be a senior water resources planner with experience in the preparation of decision documents related to flood risk management studies.
Economics	The Economics reviewer should be a senior economist with experience in quantifying benefits related to flood risk management studies. This reviewer will also be responsible for review of any economics models. They should be an expert in the model approval process and have experience in the quantification of non-inundation damage assessments.
Environmental Resources	The Environmental Resources reviewer should be a senior professional with NEPA experience. The Environmental Resources reviewer will also act as the Cultural/Historical Resources reviewer. The Environmental Resources reviewer may choose to delegate the Cultural/Historical Resources review to a professional with equal or greater experience in Section 106 NHPA consultation and other relevant laws, guidance, and policies as they relate to Cultural/Historical Resources.
Hydraulic Engineering	The Hydraulic Engineering reviewer should be a senior, registered engineer with experience in the design of flood risk management structures.
Geotechnical Engineering	The Geotechnical Engineering reviewer should be a senior, registered engineer with experience in geotechnical analyses as they pertain to the

	construction of flood risk management measures.
Cost Engineering	The Cost Engineering reviewer should be familiar with cost engineering of flood risk management measures using the MCACES model and preparation of Mill Cost estimates. The reviewer should be a certified cost technician, consultant, or engineer.
Real Estate	The real estate reviewer should have experience in the application of real estate law and Federal policies and guidance in the application thereof.

c. Documentation of ATR. DrCheckssm review software will be 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 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 Project Delivery Team (PDT) response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes POA, RMC, POD, and HQUSACE), and the agreed upon resolution. If an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrCheckssm with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review;
- 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;
- Identify and summarize each unresolved issue (if any); 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.

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date, for the draft report and final report. A sample Statement of Technical Review is included in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents under certain circumstances. 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. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist 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. There are two types of IEPR:

- Type I IEPR. Type I IEPR reviews are managed by an Outside Eligible Organization (OEO) external to the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address

all underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-214.

- **Type II IEPR.** Type II IEPR, or Safety Assurance Reviews (SAR), are managed by the RMC and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to 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.

a. Decision on IEPR. Since non-performance of the project could pose a significant threat to human life safety and implementation of a project will likely cost more than \$10 million but less than \$200 million, a Type I IEPR is planned.

b. Products to Undergo Type I IEPR. Products to undergo IEPR include the Moose Creek DSMS and EA with appendices.

c. Required Type I IEPR Panel Expertise. The following IEPR expertise is required for this project. Where possible, IEPR panel members will address multiple disciplines and emphasis. Table 6 provides an initial assessment by the PDT and RMC of the expertise needed based on the PMP and the factors affecting the scope of level of review outlined in Section 3. The PDT may suggest candidates for the IEPR to the RMC and OEO. The OEO will determine the final participants on the panel. The panel will include the necessary expertise to assess the engineering, environmental, and economic adequacy of the decision document as required by EC 1165-2-214, Appendix D. Once identified, the IEPR panel members for this study and a brief description of their credentials will be added in Attachment 1.

Table 6: IEPR Required Expertise

IEPR Panel Members/Disciplines	Expertise Required
Economics	The Economics Panel Member should have extensive experience in evaluation of benefits as they pertain to the construction of dams as well as the laws and policies which govern the process by which the Corps calculates those benefits.
Environmental	The Environmental Resources reviewer should be a senior professional with NEPA experience. The

	Environmental Resources reviewer will also act as the Cultural/Historical Resources reviewer. The Environmental Resources reviewer may choose to delegate the Cultural/Historical Resources review to a professional with equal or greater experience in Section 106 NHPA consultation and other relevant laws, guidance, and policies as they relate to Cultural/Historical Resources.
Hydraulic Engineering	The Hydraulic Engineering reviewer should be a senior, registered engineer with experience in the design of flood risk management structures. The hydraulic engineering reviewer should be a registered engineer.
Geotechnical Engineering	The Geotechnical Engineering reviewer should be a senior, registered engineer with experience in geotechnical analyses as they pertain to the construction of flood risk management measures.
Cost Engineering	The Cost Engineering reviewer should have extensive experience in cost engineering of flood risk management measures using the MCACES model and preparation of MII Cost estimates. The reviewer should be a certified cost technician, consultant, or engineer.

d. Documentation of Type I IEPR. The IEPR panel will be selected and managed by an OEO per EC 1165-2-214, Appendix D. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 5.c. above. The OEO will prepare a final Review Report that will accompany the publication of the final decision document 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;
- 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 OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

7. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the study process for their compliance with law and policy. Policy and legal compliance review guidance 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 POD Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published USACE policies, particularly policies on analytical methods and the presentation of findings in decision documents.

8. COST ENGINEERING AND ATR MANDATORY CENTER OF EXPERTISE (MCX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering and ATR MCX, located in the Walla Walla District. The MCX will assist in determining the expertise needed on the ATR team and Type I IEPR team (if required) and in the development of the review charge(s). The MCX will also provide the Cost Engineering Certification. The RMC is responsible for coordination with the Cost Engineering MCX.

9. MODEL CERTIFICATION AND APPROVAL

a. Planning Models. EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined 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 use of a certified/approved planning model does not constitute technical review of the planning product. 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).

In accordance with EC 1105-2-412 Paragraph 5.c., models that are single-use or study-specific require approval that the model is a technically and theoretically sound and functional tool that can be applied during the planning process by knowledgeable and trained staff for purposes consistent with the model's purpose and limitations. For this

project, the PM will coordinate with the Dam Safety Modification Mandatory Center of Expertise (DSMMCX) in determining the appropriate level of review for model approval. At this time, the Economics ATR reviewer has been assigned responsibility for conducting the model review.

The following planning models are anticipated to be used in the development of the decision document:

Table 7: Planning Models

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
HEC-FDA 1.2.5a (Flood Damage Analysis)	The Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating flood risk management plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans along the Chena River to aid in the selection of a recommended plan to manage flood risk.	Certified
Study-specific Economics spreadsheet model	This model will be used to quantify damages not captured (non-inundation related) by HEC-FDA.	Approval review to be coordinated with MCX.

b. Engineering Models. EC 1105-2-412 does not cover engineering models used in planning. 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. As part of the USACE Scientific and Engineering Technology Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. 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 in the development of the decision document:

Table 8: Engineering Models

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 4.1 (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the Chena River.	HH&C CoP Preferred Model
Floodplain Mapping Model	The Modeling, Mapping, and Consequence Center produced a floodplain mapping model for the Chena River.	Mapping, Modeling, and Consequence Center-approved
Microcomputer Aided Cost Engineering System (MCACES) 2 nd Generation (MII)	The MCACES MII construction cost estimating software is a tool used by cost engineers to develop and prepare all USACE Civil Works cost estimates. Using the features in this system, cost estimates are prepared uniformly allowing cost engineering throughout USACE to function as one virtual cost engineering team.	Cost Engineering MCX Required Model

10. REVIEW SCHEDULES AND COSTS

a. DQC Schedule and Cost. The DQC for this study will be accomplished in accordance with the cost and schedule in the PMP. As of the approval date of this Review Plan, the DQCs of the various documents are schedule as follows:

- Future Without Action Conditions – April 2015.
- Interim Risk Reduction Measures – January 2015.
- DSMS & EA with Appendices – November 2016.
- Estimated Cost: \$25,000.
- Estimated Duration: 2-3 weeks.

b. ATR Schedule and Cost. The ATRs for this study will be accomplished in accordance with the cost and schedule in the PMP. As of the approval date of this Review Plan, the ATRs of the various documents are scheduled as follows:

- Interim Risk Reduction Measures – January 2015.

- Future Without Action Conditions – May 2015.
- DSMS & EA with Appendices – December 2016.
- Estimated cost: \$94,200.
- Estimate Duration: 1 month.

c. Type I IEPR Schedule and Cost. The IEPR for this study will be accomplished in accordance with the cost and schedule in the PMP. As of the approval date of this Review Plan, a Type I IEPR that includes a Safety Assurance Review is scheduled as follows:

- DSMS & EA with Appendices – January 2017.
- Estimated Contract Cost: \$200,000.
- Estimated Duration: 1 month.

Pursuant to Section 2034 of the Water Resources Development Act (WRDA) of 2007, this amount is 100% federally funded.

- Estimated cost for POA and RMC Coordination for the IEPR: \$84,000.
- Estimated Duration: 2 months.

This estimate was developed using the Type I IEPR Standard Operating Procedure table provided by the PCXs.

d. Model Certification/Approval Schedule and Cost. Study-specific model approval schedule and cost is to be determined.

11. PUBLIC PARTICIPATION

State and Federal resource agencies may be invited to participate in the study covered by this review plan as partner agencies or as technical members of the PDT, as appropriate. Agencies with regulatory review responsibilities will be contacted for coordination as required by applicable laws and procedures. The ATR team will be provided copies of public and agency comments. This Review Plan and all decision documents will be posted on the POA's website for public review. The specific address where this Review Plan will be posted is:

<http://www.poa.usace.army.mil/Library/ReportsandStudies.aspx>. A detailed explanation of public involvement plans is discussed in the Project Management Plan.

Currently, it is estimated that the NEPA document will be available for public review and comment from mid-October to mid-December, 2016. Significant public comments will be made available to reviewers along with draft responses after being compiled by the PDT.

12. REVIEW PLAN APPROVAL AND UPDATES

The POD Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving POA, POD, RMC, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. POA is responsible for keeping the Review Plan up to date. Minor changes to the Review Plan since the last POD Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) will be re-approved by the POD Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commander's approval memorandum, will be posted on the POA webpage. The latest Review Plan should also be provided to RMC and POD.

13. REVIEW PLAN POINTS OF CONTACT

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

Alaska District

Julie Anderson, Project Manager
USACE, Alaska District
PO Box 5898
JBER, AK 99506-0898
Telephone: (907) 753-5685

Pacific Ocean Division

Mr. Russell Iwamura
USACE, Pacific Ocean Division
Building 525
Ft. Shafter, HI 96858-5440
Telephone: (808) 835-4625

Review Management Organization

John D. Clarkson
USACE, Risk Management Center
Federal Bldg, Room 502
8th Street
Huntington, WV 25701-2070
Telephone: (304) 399-5217

ATTACHMENT 1: TEAM ROSTERS

Table 9: Project Delivery Team

Discipline	Team Member	Office
Dam Safety Officer	Dave Frenier	CEPOA-EN
Dam Safety Program Manager	John Rajek	CEPOA-EN-ES-GM
Chief, Engineering Services	James Saucedo	CEPOA-EN-ES
Project Manager	Julie Anderson	CEPOA-CO-O
Planning	Jason Norris	CEPOA-PM-C-PL
Hydraulics & Hydrology	Nathan Epps	CEPOA-EN-ES-HH
Hydraulics & Hydrology	Wendy Shaw	CEPOA-EN-ES-HH
Economics	Nicholas Lutz	CEPOA-PM-C-PL
Environmental Resources	Chris Floyd	CEPOA-PM-C-ER
Geotechnical Engineer	Rob Weakland	CEPOA-EN-ES-GM
Cost Engineering	Christine Morgan	CEPOA-EN-CE
Value Engineering Officer	Don Tybus	CEPOA-EN-CE
Office of Counsel	Phillip Santerre	CEPOA-OC

Table 10: DQC Review Team

Discipline	Office	Description of Credentials
Planning	CEPOA-PM-C-PL	Chief of Civil Works Planning
Hydraulics & Hydrology	CEPOA-EN-ES-HH	Chief of Hydraulics & Hydrology
Economics	CEPOA-PM-C-PL	Senior Economist
Environmental Resources	CEPOA-PM-C-ER	Chief, Environmental

		Resources
Geotechnical Engineering	CEPOA-EN-G-GM	Chief, Geomatics
Cost Engineering	CEPOA-EN-CE	Chief, Cost Engineering

Table 11: ATR Review Team

Discipline	Office	Description of Credentials
ATR Lead	CELRH-DSPC-GS	To Be Provided (TBP)
Planning	CEIWR-GW	TBP
Hydraulics & Hydrology	CEMVS-EC-GD	TBP
Economics	CELRH-NC	TBP
Environmental Resources	CELRN-PM-P	TBP
Geotechnical Engineering	CENWK-ED-GG	TBP
Cost Engineering	TBD, CX	TBP
Mechanical Engineering	CELRH-DSPC-TS	TBP
Structural Engineering	CESWL-EC-S	TBP
RMC Advisor	RMC	TBP

Table 12: IEPR Panel

Discipline	Organization	Description of Credentials
Hydraulics & Hydrology	To Be Determined (TBD)	TBP
Economics	TBD	TBP
Environmental Resources	TBD	TBP
Geotechnical Engineering	TBD	TBP
Cost Engineering	TBD	TBP

ATTACHMENT 2: SAMPLE STATEMENT OF DISTRICT QUALITY FOR DECISION DOCUMENTS

COMPLETION OF DISTRICT QUALITY CONTROL REVIEW

The District has completed the Dam Safety Modification Study for Moose Creek Dam at North Pole, Alaska. Notice is hereby given that District Quality Control review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the District Quality Control review, 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 analysis; alternatives evaluated; the appropriateness of data used and level of data obtained; and reasonableness of the results, including adherence to Civil Works policy and guidance.

_____ TBD (vacant), Chief, Planning	_____ Date
_____ Lorraine Cordova, Chief, Economics	_____ Date
_____ Mike Noah, Chief, Environmental Resources	_____ Date
_____ Ken Eisses, Chief, Hydraulics & Hydrology	_____ Date
_____ Karl Harvey, Chief, Cost Engineering	_____ Date
_____ Jason Norris, Lead Planner (Technical Lead)	_____ Date

CERTIFICATION OF DISTRICT QUALITY CONTROL REVIEW

As noted above, all concerns resulting from independent technical review of the project have been considered. The report and all associated documents required for this phase of the study by the National Environmental Policy Act have been fully reviewed.

_____ Bruce Sexauer, Chief, Civil Project Management	_____ Date
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ATTACHMENT 3: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Moose Creek Dam Safety Modification Study for Moose Creek Dam in North Pole, Alaska. 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 DrCheckssm.

Michael Robinette
ATR Team Leader
CELRH-DSPC-GS

Date

Julie Anderson
Project Manager
CEPOA-CO-O

Date

Name
Architect Engineer Project Manager¹
Company, location

Date

John D. Clarkson
Review Management Office
Representative
CEPOD-PDC

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.

Dave Frenier
Chief, Engineering Division
CEPOA-EN

Date

Bruce Sexauer
Chief, Planning Division
CEPOA-PM-C-PL

Date

Nathan Snorteland
Director, Risk Management Center
CEIWR-RMC

Date

¹ Only needed if some portion of the ATR was contracted

ATTACHMENT 4: REVIEW PLAN REVISIONS

Table 13: Review Plan Revisions

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 5: ACRONYMS AND ABBREVIATIONS

Table 14: Standard Acronyms and Abbreviations

Term	Definition	Term	Definition
ASA(CW)	Assistant Secretary of the Army for Civil Works	NEPA	National Environmental Policy Act
ATR	Agency Technical Review	NHPA	National Historic Preservation Act
BI/COI	Background Information and Confidential Conflict of Interest Disclosure	O&M	Operation and maintenance
CEIWR	U.S. Army Corps of Engineers, Institute for Water Resources	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
CEPOA	U.S. Army Corps of Engineers, Alaska District	OEO	Outside Eligible Organization
DPR	Detailed Project Report	PCX	Planning Center of Expertise
DQC	District Quality Control/Quality Assurance	PDT	Project Delivery Team
DSMS	Dam Safety Modification Study	PL	Public Law
DSOG	Dam Senior Oversight Group	PM	Project Manager
DSPMT	Dam Safety Project Management Tool	PMP	Project Management Plan
EA	Environmental Assessment	POA	U.S. Army Corps of Engineers, Alaska District
EC	Engineer Circular	POD	U.S. Army Corps of Engineers, Pacific Ocean Division
EM	Engineer Manual	QMP	Quality Management Plan
ER	Engineer Regulation	QA	Quality Assurance

FRM	Flood Risk Management	QC	Quality Control
HEC-FDA	Hydrologic Engineering Center-Flood Damage Reduction Analysis	QCC	Quality Control and Consistency Review
HEC-RAS	Hydrologic Engineering Center-River Analysis System	RMC	Risk Management Center
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMO	Review Management Organization
IEPR	Independent External Peer Review	SAR	Safety Assurance Review
IRRM	Interim Risk Reduction Measure	SOG	Senior Oversight Group
IRRMP	Interim Risk Reduction Measure Plan	TBD	To Be Determined
MCACES	Microcomputer Aided Cost Engineering System	USACE	U.S. Army Corps of Engineers
MSC	Major Subordinate Command	WRDA	Water Resources Development Act
MCX	Mandatory Center of Expertise		

