



REPLY TO
ATTENTION OF

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

CEPOD-RBT

24 AUG 2011

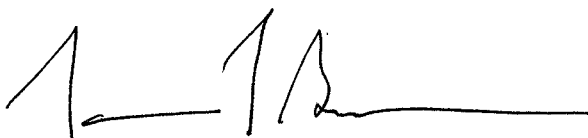
MEMORANDUM FOR COMMANDER ALASKA ENGINEER DISTRICT (CEPOA-PM-CW/TINA MCMASTER-GOERING), P.O. BOX 898, ELMENDORF AFB, AK 99506-0898

SUBJECT: Review Plan Approval for the Interim Risk Reduction Measures Plan (IRRMP) for the Lowell Creek Dam, Seward, Alaska

1. The enclosed Review Plan for the Lowell Creek Dam, Seward, Alaska IRRMP has been prepared in accordance with EC 1165-2-209, Civil Works Review Policy, dated 31 January 2010. The City of Seward owns the Lowell Creek Dam and the IRRMP identifies actions that the City of Seward can implement to reduce the probability of potential uncontrolled debris flows through the town. The Alaska District is the lead office to execute this Review Plan which does not include Type II Independent External Peer Review.
2. I approve this Review Plan. It is subject to change as circumstances require, consistent with project development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.
3. The point of contact for this memorandum is Mr. Russell Iwamura, Senior Economist, Civil Works Integration Division, at 808-438-8859 or email Russell.K.Iwamura@usace.army.mil.

FOR THE COMMANDER:

Encl
as


JAMES L. BERSSON, P.E., SES
Director, Regional Business

REVIEW PLAN

**Lowell Creek Dam
Seward, Alaska**

For

Interim Risk Reduction Measures Plan

Alaska District

**MSC Approval Date: 24 August 2011
Last Revision Date: None, Original Review Plan**



**US Army Corps
of Engineers ®**

REVIEW PLAN

**Lowell Creek Dam
Seward, Alaska**

**For
Interim Risk Reduction Measures Plan**

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1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Interim Risk Reduction Measures Plan for the Lowell Creek Dam in Seward, Alaska.

b. References

- (1) Engineering Circular (EC) 1165-2-209, Civil Works Review Policy, 31 Jan 2010
- (2) EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
- (3) Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
- (4) ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
- (5) Project Management Plan for Lowell Creek Dam Interim Risk Reduction Measures, 2 May 2011
- (6) Alaska District Quality Management Plan - CEPOA-QMP-001, 20 January 2010
- (7) EC 1110-2-6061, Safety of Dams – Policy and Procedures, April 2004.
- (8) EC 1110-2-6064, Interim Risk Reduction Measures for Dam Safety, 31 May 2007
- (9) ER 5-1-11, Management USACE Business Practices, 1 November 2006
- (10) ER 1110-2-1156, Safety of Dams – Policy and Procedures, November 2010
- (11) ER 1110-2-1302, Engineering and Design Civil Works Cost Engineering, 15 September 2008
- (12) ER 1110-2-1806, Earthquake Design and Evaluation for Civil Works Projects, July 1995
- (13) Engineering Manual (EM) 1110-2-1411, Standard Project Flood Determinations, March 1965
- (14) EM 1110-2-1420, Hydraulic Engineering Requirements for Reservoirs, October 1997
- (15) Engineering Pamphlet (EP) 1165-2-1, Digest of Water Resources Policies and Authorities, July 1999
- (16) Engineering Technical Letter (ETL) 1110-2-571, Guidelines for Landscape Planting and Vegetation Management at Levees, Floodwalls, Embankment Dams, and Appurtenant Structures, April 2009
- (17) Federal Emergency Management Agency, Federal Guidelines for Dam Safety, FEMA 93, April 2004
- (18) Federal Emergency Management Agency, Impacts of Plants on Earthen Dams, FEMA 534, September 2005

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-209, 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 (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 1165-2-209) and planning model certification/approval (per EC 1105-2-412).

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. A Planning Center of Expertise (PCX); the Risk Management Center (RMC); or a division typically

functions as the RMO depending on the product being reviewed. A district may also serve as the RMO when only District Quality Control is required. The RMO for the review of this Interim Risk Reduction Measures Plan is the Alaska District.

Should higher levels of review become necessary, the RMC will take over as the RMO. As the RMO, the RMC responsibilities will include managing the ATR and coordinating with other centers to ensure the appropriate expertise is included on the review teams.

The Alaska District will post the approved Review Plan on its public website. The MSC Commander has approval authority for this Review Plan.

3. STUDY INFORMATION

- a. **Interim Risk Reduction Measures Plan (IRRMP).** Lowell Creek Dam, an integral component of the Lowell Creek Flood Control Project, located 125 miles south of Anchorage, Alaska was classified as a Dam Safety Action Classification (DSAC) III dam on March 21, 2011. This classification places the Lowell Creek Dam in a category of "high priority," which is considered conditionally unsafe requiring immediate attention to reduce risk from potential failure modes.

In accordance with Engineering Circular (EC) 1110-2-6064 *Interim Risk Reduction Measures for Dam Safety*, the Alaska District prepared the Interim Risk Reduction Measures Plan (IRRMP) to identify actions to reduce the probability of potential uncontrolled debris flow through town. The document addressed in this review plan is the IRRMP. The purpose of the IRRMP is to propose Interim Risk Reduction Measures (IRRM) the City of Seward, with assistance from the Alaska District, can implement to allow for continued operation of the Lowell Creek FCP.

According to ER 1110-2-1156, the IRRMP shall be subjected to a District Quality Control Review (DQC) with Regional Technical Specialists or other appropriate specialists.

The Alaska District will evaluate potential impacts of implementing each IRRM in accordance with the procedural provisions of the National Environmental Policy Act (NEPA, PL 91-190), pertinent implementing regulations, and other Federal laws. The Alaska District will employ all practicable measures to avoid, minimize or otherwise mitigate adverse effects on important resources while ensuring that the Lowell Creek Flood Control Project (FCP) avoids loss of life and minimizes loss of property. The NEPA evaluation will consider recreational, environmental, and cultural impacts of the recommended IRRMs in an environmental assessment (EA). The EA process will be completed with a decision that determines the action will have no significant impact or that a supplemental environmental impact statement will be prepared.

The Alaska District will comply with environmental regulations in a tiered process. The first tier will focus on immediate needs and the direct and immediate potential for environmental impacts to resources that are of particular concern and that are most vulnerable to impacts. The EA prepared for this process will fully disclose the immediate actions that will be taken and the review process will present opportunities to involve stakeholders and to scope the second tier process. The first tier EA will be completed before any major Federal action is implemented unless emergency action is required to protect human life or property.

The second tier of the process will fully engage stakeholders, thoroughly identify issues and concerns, and address potential for cumulative impacts and impacts that would be less than significant, but that should be considered in a federal decision making process.

- b. Study/Project Description.** The City of Seward is located on the head of Resurrection Bay on the Kenai Peninsula, 125 miles south of Anchorage by highway. The Lowell Creek Flood Control Project (FCP) was authorized by Congress as a Corps of Engineers project on August 25, 1937 (Public Law No. 369; 50 Stat. 806). Original construction was completed in November 1940 with alterations completed in 1945. The Lowell Creek FCP is in an area of high seismicity. The magnitude 9.2 earthquake of 1964 did not cause major damage to the project. The existing project is on Lowell Creek with its diversion tunnel constructed through Bear Mountain on the southwest side of the city. The project consists of a diversion dam and three primary appurtenant structures: tunnel, intake, and outlet.

The Lowell Creek Dam is an approximately 400-foot-long rock-fill dam faced with reinforced concrete on the crest and upstream side and grouted rubble masonry on the downstream side. The City of Seward owns the Lowell Creek Dam.

Spillway: A grouted rubble masonry spillway section approximately 70 feet long is immediately upstream adjacent to the tunnel entrance. The spillway allows water to spill over into the old creek bed and down into the City of Seward. The spillway is essentially a lowered section of the crest and was designed with a maximum discharge of 1,700 cubic feet per second (cfs).

Abutments: The left abutment of the dam is constructed against the canyon wall. The rock is cut at a 4:1 slope with a concrete slab attached with dowels against the rock face. The right abutment of the dam is tied into the entrance to the tunnel, which is cast into the rock of Bear Mountain.

Tunnel: The Lowell Creek Tunnel is a nominally 10-foot diameter, 2,068-foot long, horseshoe-shaped tunnel. The invert is lined with steel-rail armoring embedded in the concrete of the floor and lower walls along the upstream portion of its length. The outfall was designed for a capacity of 2,600 cfs with the water surface at the spillway crest. Most maintenance has been directed toward repair of the tunnel. The concrete lining has rapidly eroded due to super critical velocities carrying sand, gravel, cobbles, and boulders into and through the tunnel.

Tunnel Inlet: The tunnel inlet is a concrete ogive section with embedded steel rails for impact and scour reinforcement. The intake ties into the tunnel entrance and parallels the toe of the dam.

Tunnel Outlet: The Lowell Creek Tunnel outlet discharge flows to Resurrection Bay south of the City of Seward. A bridge was placed over the outfall area to connect Seward to Lowell Point via Lowell Point Road after tunnel construction. Significant quantities of material and debris are known to accumulate at this bridge, especially during periods of high flow. An estimated 27,000 cubic yards of rock and debris is carried through the tunnel each year. In the October 2006 and July 2009 flood events, gravel had accumulated and overtopped the bridge leaving Lowell Point inaccessible by road.

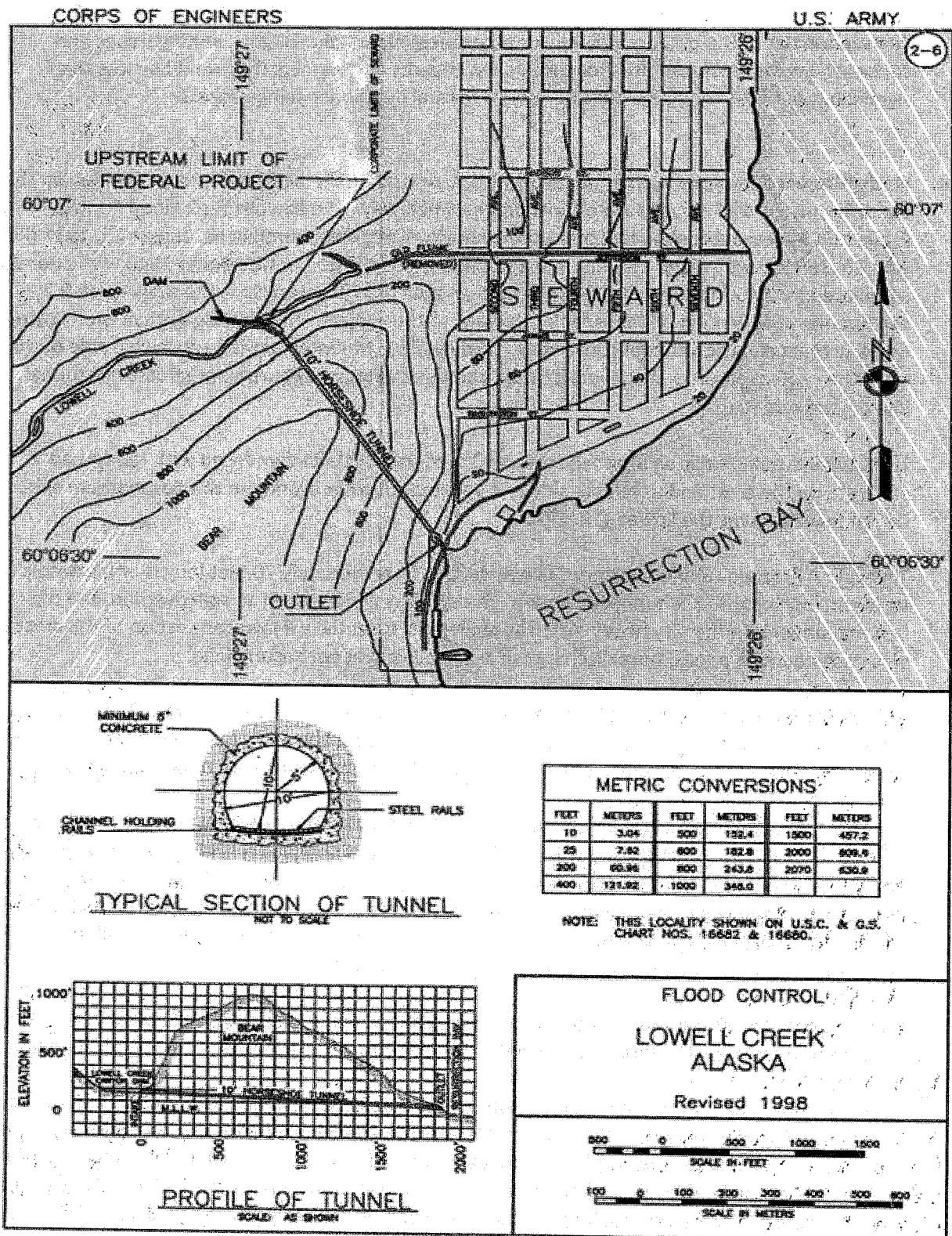


Figure 1. General Locations of Lowell Creek Dam Features

The IRRMP is meant to identify measures which can be taken in the short term to minimize risk to public safety while determining what, if any, long-term permanent fixes are required. In

establishing an IRRMP, the prevention of loss of life is the first and foremost objective followed by prevention of catastrophic economic and environmental losses.

The Corps of Engineers policy EC 1110-2-6064 *Interim Risk Reduction Measures for Dam Safety*, requires the District to: (1) Take immediate action to avoid failure; (2) Implement Interim Risk Reduction measures including: operational restrictions, structural and non-structural measures, update emergency action plans, transparent and open public communications; (3) Increase monitoring and evaluation; (4) Expedite investigations to support remediation and funding using all resources and funding necessary; and (5) Initiate intensive management and situational reports. The Corps of Engineers guidance ER 1110-2-1156 is a Dam Safety Regulation which provides updated regulations and guidance for the DSAC process. Since the Lowell Creek Dam is owned by the City of Seward but is unique, the Alaska District is assisting the City of Seward to implement the IRRMs.

- c. **Factors Affecting the Scope and Level of Review.** In a March 8, 2010 teleconference between the Alaska District, the Pacific Ocean Division, and the Corps' Risk Management Center (RMC) regarding the review requirements for the Moose Creek Dam DSAC activities, participants were informed that Type II IEPR would not be required for projects of an emergency nature. Therefore, the IRRMP will not require Type II IEPR as the proposed measures are formulated under emergency circumstances in order to mitigate the risk associated with the existing flood risk management project.

The risk reduction measures implementation is consistent with EC 1110-2-6064 under which practical options are developed and planned to reduce the probability of catastrophic failure and associated consequences. These measures are to be implemented while long term remedial measures are pursued through separate studies. This review plan addresses only the IRRMP for the Lowell Creek Dam; additional studies identifying long-term solutions will require a separate review plan or an update to this review plan when the future studies/reports are understood in detail.

According to ER 1110-2-1156, the IRRMP shall be subjected to a District Quality Control Review (DQC) with Regional Technical Specialists or other appropriate specialists.

The information presented in the IRRMP is not based on the use of novel methods, does not use innovative materials or techniques, does not present complex challenges for interpretation, does not contain precedent-setting models or methods, and does not present conclusions that are likely to change common engineering practices.

- d. **In-Kind Contributions.** Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. At this time, no in-kind services are anticipated.

4. DISTRICT QUALITY CONTROL (DQC)

DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

DQC is the foundation for quality of all products, and there are routine district processes that cover DQC. Section Chiefs are responsible for all work products produced by disciplines in their sections. Reviewers should be individuals who are not involved with the project. DQC is conducted for all reports

covered by this document. All team members review the final work product to ensure coordination of disciplines and to provide quality assurance. Branch Chiefs will ensure that DQC is completed.

- a. **Documentation of DQC.** DQC is documented by a district process where Section Chiefs and Branch Chiefs formally certify products once they are complete. This is conducted after each review.

ER 1110-2-1156, Section 7.5.9 requires that DQC comments and resolutions be included in the final submission of the IRRMP.

- b. **Products to Undergo DQC.** The IRRMP, for which this review plan was developed, will undergo DQC.

- c. **Required DQC Expertise.** According to ER 1110-2-1156, Section 7.5, the DQC will be conducted using Regional Technical Specialists or other appropriate specialists. These personnel should specialize in the following fields in order to assure comprehensive review of the IRRMP:
Geotechnical, structural, Hydraulics & Hydrology, Environmental Resources, and Cost Engineering.

The IRRMP is considered technical in nature and the DQC should be performed by technical experts familiar with flood risk management projects and water control procedures. They should be further familiar with dam safety and the risk informed decision making process. In addition they should be technical subject matter experts in Hydrology and Hydraulics who have a strong working knowledge of flood damage reduction projects and water control plans. The regional technical specialist who will participate in the review of the IRRMP is Tatsuji Hirata, the Pacific Ocean Division Dam Safety Program Manager.

5. AGENCY TECHNICAL REVIEW (ATR)

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 the designated RMO and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE personnel and may be supplemented by outside experts as appropriate. The ATR team lead will be from outside the home MSC.

- a. **Products to Undergo ATR.** According to ER 1110-2-1156, Section 7.5 (dated November 2010), the appropriate level of review for the IRRMP is District Quality Control (DQC) utilizing Regional Technical Specialists or other appropriate specialists. Utilizing this guidance, ATR is not required for the Lowell Creek Dam IRRMP. The RMC concurs with this course of action.

- b. **Required ATR Team Expertise.** Not Applicable.

- c. **Documentation of ATR.** Not applicable.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

IEPR may be required for decision documents and implementation documents as well as other work products 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 1165-2-209, 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 outside 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 1165-2-209.
 - **Type II IEPR.** Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE 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.** According to ER 1110-2-1156, Section 7.5 (dated November 2010), the appropriate level of review for the IRRMP is DQC. Utilizing this guidance, IEPR is not required for the Lowell Creek Dam IRRMP. The RMC concurs with this course of action.
 - b. **Products to Undergo Type I IEPR.** Not Applicable.
 - c. **Required Type I IEPR Panel Expertise.** Not Applicable.
 - d. **Documentation of Type I IEPR.** Not Applicable.

7. POLICY AND LEGAL COMPLIANCE REVIEW

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

analytical methods and the presentation of findings.

8. COST ENGINEERING DIRECTORY OF EXPERTISE (DX) REVIEW AND CERTIFICATION

The RMO is responsible for coordinating with the Cost Engineering DX, located in the Walla Walla District. The DX 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 DX will also provide the Cost Engineering DX certification. This coordination will take place should an ATR or IEPR become necessary.

9. MODEL CERTIFICATION AND APPROVAL

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).

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 (SET) 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).

- a. **Planning Models.** No planning models will be used in the development of the Lowell Creek Dam IRRMP.
- b. **Engineering Models.** It is anticipated that no engineering models will be used in the development of the Lowell Creek Dam IRRMP.

10. REVIEW SCHEDULES AND COSTS

- a. **ATR Schedule and Cost.** Not Applicable.
- b. **Type I IEPR Schedule and Cost.** Not Applicable.
- c. **Model Certification/Approval Schedule and Cost.** Not Applicable.

11. PUBLIC PARTICIPATION

The public will be afforded the opportunity to comment on the proposed intermediate risk reduction measures through a public meeting (current date TBD after approval of the IRRMP) and through review

of the EA for the Interim Risk Reduction Measures Plan. The EA's public comment period will be identified in the future.

This review plan, following approval by the MSC Commander, will be posted on the Alaska District web page for public information and review. Any comments received from the public will be considered in future versions of the review plan and, as appropriate, in other project actions.

Future Dam Modifications will likely require environmental compliance with its associated public review. In addition, the Alaska District is committed to keeping the public informed through our web site, news releases, and potential future public meetings.

12. REVIEW PLAN APPROVAL AND UPDATES

The Pacific Ocean Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, 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. According to ER 1110-2-1156, Section 7.5 (dated November 2010), the appropriate level for the IRRMP is District Quality Control (DQC) utilizing Regional Technical Specialists or other appropriate specialists. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 2. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

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 POC: POA Dam Safety Program Manager, Marcus Palmer, Ph. (907) 753-2665
- Pacific Ocean Division POC: POD Dam Safety Program Manager, Tatsuji Hirata, Ph. (808) 438-7078
- Risk Management Center POC: RMC Director, Nate Snorteland, Ph. (571) 232-9189

ATTACHMENT 1: TEAM ROSTERS**Table 1. PDT Members**

Name	E-mail Address	Phone (Area Code 907)
Julie Anderson	Julie.l.anderson@usace.army.mil	753-5685
Tina McMaster-Goering	Tina.m.mcmaster-goering@usace.army.mil	753-2861
Crane Johnson	crane.johnson@usace.army.mil	753-5615
Dave Spence	david.l.spence@usace.army.mil	753-2666
Guy McConnell	guy.r.mcconnel@usace.army.mil	753-2614
Jerry Zuspan	jerry.h.zuspan@usace.army.mil	753-2660
Ken McNally	kenneth.d.mcinnally@usace.army.mil	753-5691
Karl Harvey	karl.j.harvey@usace.army.mil	753-5738
Ken Eisses	kenneth.j.eisses@usace.army.mil	753-2742
Marcus Palmer	marcus.d.palmer@usace.army.mil	753-2665
Robert Tedrick	Robert.c.tedrick@usace.army.mil	753-5745
Tom Findtner	tom.findtner@usace.army.mil	753-2522
Wendy Shaw	Wendy.l.shaw@usace.army.mil	753-5798

*Other team members and peer reviewers will be added as necessary.

Table 2. Pacific Ocean Division Dam Safety Team

Name	Function	Phone
Tatsuji Hirata	POD Dam Safety Program Manager	(808) 438-7078
George Ward	POD Chief, Business Technical Division and Dam Safety Officer	(808) 438-9737
Terry Kojima	POD Public Affairs Officer	(808) 438-8319
Helen Stuppelbeen	POD Program Manager	(808) 438-8526

Table 3. District Quality Control Team/Regional Technical Specialists

Name	Function	Phone
Tatsuji Hirata	Regional Technical Specialist/POD Dam Safety Program Manager	(808) 438-7078
TBD	Geotechnical and Hydraulics & Hydrology	

Table 4. Vertical Team

Name	Function	Phone
Marcus Palmer	POA Dam Safety Manager	(907) 753-3665
David Frenier	POA Dam Safety Officer	(907) 753-2662
Tats Hirata	POD Dam Safety Program Manager	(808) 438-7078
George Ward	POD Dam Safety Officer	(808) 438-9737
Nate Snorteland	Risk Management Center Director	(571) 232-9189

Travis Tutka	HQUSACE Dam Safety Program Manager	(202) 761-4643
Eric Halpin	HQUSACE Special Assistant for Dam and Levee Safety	(202) 761-7662
James Dalton	HQUSACE Dam Safety Officer	(202) 761-8826

ATTACHMENT 2: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 3: ACRONYMS AND ABBREVIATIONS

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

