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

CEPOD-PDC 4 December 2020

MEMORANDUM FOR Commander, Alaska Engineer District (CEPOA-PM-C/Philip Hejduk), P.O. Box 6898 JBER, AK 99506-0898

SUBJECT: Approval of the Review Plan for the Lowell Creek Flood Diversion Feasibility Report

1. References:

a. Engineering Circular 1165-2-217, Review Policy for Civil Works, 20 Feb 18.

b. Review Plan for the Lowell Creek Flood Diversion Feasibility Report, Alaska District, U.S. Army Corps of Engineers. (Encl)

2. This memorandum constitutes approval of the Review Plan for the Lowell Creek Flood Diversion Feasibility Report, Alaska District, U.S. Army Corps of Engineers, which does not include 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 revisions to this Review Plan or its execution require my written approval.

4. POC is Mr. Russell Iwamura, Team Leader for Planning and Policy, Civil Works Integration Division, at 808-835-4625 or email Russell.K.Iwamura@usace.army.mil.

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KIRK E. GIBBS
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REVIEW PLAN

Lowell Creek Flood Diversion Study
Section 5032 of the Water Resources Development Act of 2007
Feasibility Report

Alaska District

MSC Approval Date:
04 December 2020

US Army Corps of Engineers ®

REVIEW PLAN

Lowell Creek Flood Diversion Study
Section 5032 of the Water Resources Development Act of 2007
Feasibility Study

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REVIEW PLAN
December 2020

1. OVERVIEW

This Review Plan (RP) defines the scope and level of peer review for the following study:

- **Study Name:** Lowell Creek Flood Diversion Study – Section 5032 of the Water Resources Development Act of 2007, Seward, Alaska.

- **P2 Number:** 403736.

- **Federal Project:** N/A.

- **Decision Document - Type:** Integrated Feasibility Report and Environmental Assessment (EA).

- **Project Type:** Flood Risk Management.

- **Congressional Authorization Required (Yes/No)**: No.

- **District:** Alaska District (POA).

- **Major Subordinate Command (MSC):** Pacific Ocean Division (POD).

- **Review Management Organization (RMO):** Flood Risk Management Center of Expertise (FRM-PCX).

- **Review Plan Contacts:**

    - **District:** Lead Planner, 907-753-5632.

    - **MSC:** Chief, Planning and Regulatory, 808-835-4625.

    - **RMO Contact:** NWD/POD FRM-PCX Regional Manager, 206-764-5522.

2. KEY REVIEW PLAN DATES

Action	Date - Actual
RMO Endorsement of RP	23 Aug 2017
POD Approval of RP	13 May 2020
Independent External Peer Review (IEPR) Exclusion Approval	Yes
Has RP changed since RMO endorsement?	No
Last RP revision	N/A
RP posted on POA Website	28 Dec 2020
Congressional notification	Pending

3. MILESTONE SCHEDULE

Action	Date - Scheduled	Date – Actual	Status – Complete?
Feasibility Cost Sharing Agreement Signed		12 Aug 2016	Yes
Alternatives Milestone Meeting (AMM)	07 Nov 2018	07 Nov 2018	Yes
Tentatively Selected Plan (TSP)	04 Mar 2020	04 Mar 2020	Yes*
Release Draft Report to Public	03 Aug 2020	21 Sep 2020	Yes
Agency Decision Milestone (ADM)	14 Dec 2020		No
Final Report Transmittal to POD	30 Apr 2021		No
Director's Report	12 May 2021		No
**TSP date pending NED Exception Approval*			

Note: A Type I Independent Expert Review Panel (IEPR) is not scheduled and an exemption is not required because the plan for Lowell Creek does not meet any of the 3 mandatory triggers per the 05-Apr-2019 Guidance. However, per EC 1165-2-217, a Type II IEPR (SAR) will be conducted during pre-construction, engineering and design (PED) because potential hazards pose a significant threat to human life (public safety). A Type II IEPR is not incorporated in this study schedule because it occurs during PED.

4. BACKGROUND

- **Date of 'Background' Information**: March 2020.

- **RP References:**

  - Engineer Circular (EC) 1165-2-217, Review Policy for Civil Works (CW), 20 February 2018.

  - EC 1105-2-412, Assuring Quality of Planning Models, 31 March 2011.

  - Engineer Regulation (ER) 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 November 2007.

  - Director's Policy Memorandum (DPM) CW Programs 2018-05, Improving Efficiency and Effectiveness in USACE CW Project Delivery (Planning Phase and Planning Activities), 3 May 2018.

  - Director of CW (DCW) Memorandum, Delegation of Model Certification, 11 May 2018.

  - DCW Memorandum, Revised Delegation of Authority in Section 2034(a)(5)(A) of the Water Resources Development Act of 2007 (WRDA 2007), as amended (33 U.S.C. 2343), 7 June 2018.

- Planning Bulletin (PB) 2018-01, Feasibility Study Guidelines, 26 September 2018.

- PB 2018-01S, Feasibility Study Milestones Supplemental Guidance, 20 June 2019.

- DPM 2019-01, Policy and Legal Compliance Review (P&LCR), 9 January 2019.

- DCW Memorandum, Revised Implementation Guidance for Section 1001 of the Water Resources Reform and Development Act (WRRDA) of 2014, Vertical Integration and Acceleration of Studies as Amended by Section 1330(b) of WRDA 2018, 25 March 2019.

- DCW Memorandum, Interim Guidance on Streamlining IEPR for Improved CW Product Delivery, 5 April 2019.

- Lowell Creek Flood Diversion Project, Seward, Alaska, Project Management Plan, Pending.

- POD Regional Quality Management Plan, August 2020.

- **Authority**: Section 5032 of the Water Resources Development Act (WRDA) of 2007.

- **Sponsor**: City of Seward.

- **Specific, Measurable, Attainable, Risk-Informed, and Timely (SMART) Planning Status**: Study is not 3x3x3 compliant, an 18-month extension waiver has been granted through 12 May 2021.

- **Project Area**: The Lowell Creek Flood Diversion System is in Seward, Alaska on the Kenai Peninsula, 125 miles south of Anchorage by highway. (Figure1). It has one of the two ice-free ports in Alaska with road and rail connections to the state's interior. Seward lies at the head of Resurrection Bay, a deep fiord about 25 miles long on the north shore of the Gulf of Alaska. Near Seward, the bay is two to three miles wide and about 500 feet deep. The water is deep immediately offshore except at the head of the bay and at the toe of alluvial fan-deltas that have formed at the mouths of steep-gradient streams tributary to the bay. The glaciated Kenai Mountains rise steeply above Resurrection Bay and the valley of the Resurrection River. With the highest peaks on the west side of the bay and river reach altitudes of 4,000 to 5,000 feet.

The Flood Diversion System reroutes Lowell Creek through Bear Mountain and around the City of Seward to Resurrection Bay (Figure 1). The City of Seward, with a population of 2,663 (in 2016), lies immediately below the flood diversion system.

Lowell Creek passes through a rocky, rugged canyon near Seward, bordered by steep hillsides and talus-covered slopes. The stream, approximately three miles long above the

tunnel, has a drainage area of about 4.1 square miles. Ground cover in the canyon is sparse (30 percent), consisting of low-growing shrubs and patches of isolated spruce and cottonwood trees in the lower portion of the basin. Small glaciers in the upper extent of the basin provide an impervious area of about ten percent of the watershed. Lowell Creek has a gradient of 1,000 feet per mile and transports large amounts of debris, often including boulders to one-half cubic yard in volume. Using all available data, it is estimated that, on average, in excess of 20,000 cubic yards of rock and other debris is carried through the tunnel by stream flow each year. There are no levees downstream or dams upstream or downstream of the Lowell Creek constructed features; either in the original creek flow path, or in the current flow path of the stream.

Figure 1. Lowell Creek Diversion System and City of Seward

- **Problem Statement:** The purpose of this project is to improve flood diversion at the Lowell Creek flood diversion system. The existing flood diversion system in Lowell Canyon does not adequately manage flood events and presents risk to life, property, and critical infrastructure with little to no warning.

The tunnel inlet at Bear Mountain is capable of transporting relatively low flows (up to 2800 cfs) through the system and is prone to blockages from upstream debris. Either a higher flow event or tunnel blockage would lead to flows going immediately into downtown Seward. In addition, the tunnel outlet near Resurrection Bay is prone to accumulation of debris and sediments at the bridge on the only road to Lowell Point community. On multiple occasions in the past the bridge has been damaged, destroyed and/or buried under as much as 20 feet of debris. This has led not only to isolation of Lowell Point, but also to damage of critical infrastructure and the Alaska SeaLife Center.

- **Study/Project Goals and Objectives:** This study aims to fulfill the following objectives:

  - Reduce risk to public health, life, and safety from flooding of Lowell Creek to city of Seward, Alaska.

  - Reduce flood damages to property and critical infrastructure in the City of Seward.

  - Reduce cost of emergency response and management of post-flood event cleanup.

  - Reduce operation and maintenance costs.

- **Description of Action and Federal Interest:** Federal Interest in improving the Lowell Creek Flood Diversion System at Seward, Alaska has been documented previously in Corps reports from 1992 and 2011. Anticipated benefits include flood damage reduction benefits for structures, vehicles, and infrastructure (such as the costs to repair roads, bridges, sewers, power lines, etc.), as well as reductions in emergency costs and future operation and maintenance costs. Improvements to life safety will also be realized through reducing the risk that the existing flood diversion system capacity will be surpassed in a future event. Previous USACE estimates of potential damages from a Probable Maximum Flood event range from $67M to $156M in 2017 dollars. Since completion of construction in 1940, it is estimated that the Corps has spent $6.7 million on maintenance of the system while the City of Seward has spent over $4 million. Preliminary life safety estimates indicate that 59 to 70 lives (day-night) could be lost as a result of flows surpassing the capacity of the existing flood diversion system. Thus far, an array of potential alternatives ranging from smaller-scale improvements to the existing system to full replacement of the existing system ($150M) have been identified. The alternatives were analyzed to determine if a plan existed with positive National Economic Development (NED) benefits that would accomplish the project objectives between the Alternatives and Tentatively Selected Plan milestones.

An initial array of alternative plans has been formulated through combinations of screened management measures. The remaining alternatives may be scaled down further during future iterations of the planning process as costs and benefits are evaluated.

Anticipated benefits of a flood diversion project are reduced life loss and reduced economic damages.

The alternatives formulated are summarized below.

Alternative 1: No Action Alternative
The no-action alternative maintains the existing project in its current state and has no change to downstream risk or consequences.

Alternative 2: Lowell Creek: Improve Existing Tunnel
Structural components of this alternative would include refurbishing the existing tunnel, extending the outfall, protecting the tunnel inlet from landslide with a canopy, and improving the low flow diversion system. Non-structural components would include tree removal and implementation of an early warning system and evacuation plan.

Alternative 3: Lowell Creek: Enlarge Current Flood Diversion System to Convey Larger Flow

(a) Structural components of this alternative would include enlarging the existing tunnel to 18 ft diameter, extending the outfall, protecting the tunnel inlet from landslide with a canopy, and improving the low flow diversion system. Non-structural components would include tree removal and implementation of an early warning system and evacuation plan.

(b) Structural components of this alternative would include enlarging the existing tunnel to 24 ft diameter, extending the outfall, protecting the tunnel inlet from landslide with a canopy, and improving the low flow diversion system. Non-structural components would include tree removal and implementation of an early warning system and evacuation plan.

Alternative 4: Lowell Creek: Construct New Flood Diversion System (Recommended Plan)

(a) Structural components of this alternative would include refurbishing the existing tunnel, constructing a new 18 ft diameter tunnel upstream from the existing tunnel, extending the outfall, protecting the tunnel inlet from landslide with a canopy, and improving the low flow diversion system. Non-structural components would include tree removal and implementation of an early warning system and evacuation plan.

(b) Structural components of this alternative would include refurbishing the existing tunnel, constructing a new 24 ft diameter tunnel upstream from the existing tunnel, extending the outfall, protecting the tunnel inlet from landslide with a canopy, and improving the low flow diversion system. Non-structural components would include tree removal and implementation of an early warning system and evacuation plan.

Alternative 5: Lowell Creek: Construct Debris Retention Basin
This alternative calls for a roller-compacted concrete structure to be constructed approximately 700 feet upstream of the existing tunnel entrance to intercept debris before it passes through the tunnel. The structure is designed to create a 25,000 cubic yard detention volume where debris, mostly sand and gravel with cobbles and some boulders, can accumulate and be hauled out after rain events. The structure is approximately 200 feet in length, with a crest approximately 15 feet above the canyon floor. The upstream embankment face would be constructed at a 1H:1V slope and the downstream face would be constructed at a 2H:1V slope, similar to the existing diversion dam.

Included in each alternative (except Alternative 5) is the provision for an extended outfall. The outfall was analyzed as a separable element and resulted in a 150-ft outfall being chosen to incorporate into the alternatives designs. The 150-ft outfall would extend over Lowell Point Road and discharge on the existing fluvial fan in relatively shallow water. A 150-ft outfall would reach over Lowell Point Road, protecting the road and bridge from sediment deposition and eliminating the need to flood fight during events.

- **Risk Identification.** The primary source of study/project risk is summarized below and explained in detail in the RP sections that follows:

  - TSP selection using existing data. There is no gauge data from Lowell Creek. Flow data has been translated from an adjacent stream to obtain estimates for Lowell Creek. While economic benefits were incorporated into the plan selection, the primary rationale stemmed from the ability of the proposed plans to reduce Average Annual Life Loss (AALL).

5. FACTORS AFFECTING THE SCOPE AND LEVEL OF REVIEW

This RP was developed in accordance with EC 1165-2-217, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works projects and Interim Guidance on Streamlining Independent External Peer Review (IEPR) for Improved Civil Works Project Delivery (5 April 2019). This RP will be provided to the Project Delivery Team (PDT), District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR) Teams, and Policy and Legal Compliance Review teams. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-217) and planning model certification/approval (per EC 1105-2-412). Any levels of review not performed in accordance with EC 1165-2-217 will require documentation in the RP of the risk-informed decision not to undertake that level of review.

As EC 1165-2-217 indicates, a Type I IEPR is conducted on project studies (decision documents). It is of critical importance for those decision documents and supporting work products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental, and social effects to the nation. However, it is not limited to only those cases and most studies should undergo Type I IEPR. Below is a list of items considered when determining if a Type I IEPR is needed.

A. Is it likely that part(s) of the study will be challenging (EC 1165-2-217, paragraph 7.a.(1))? Yes, the analysis of surge and flow to incorporate all factors contained in the complex situation found in Seward is an ongoing effort. While our current analysis does incorporate many aspects of the situation, the team is using standard USACE approved modeling software to include flow with surge probabilities and uncertainty of flow within the city to develop a more complete picture of the threat posed by the current situation.

B. Provide a preliminary assessment of where the project risks are likely to occur and assess the magnitude of those risks (EC 1165-2-217, paragraph 7.a.(1)).
Economic analysis resulted in a lack of National Economic Development (NED) flood risk management benefits to justify the construction of a flood diversion system at Lowell

Creek. The project will be justified on a combination of NED and cost effectiveness and incremental cost analysis (CE/ICA) methodologies. The metric for CE/ICA benefits is reduction in total life safety risk as exemplified by AALL. Use of AALL as a metric is contingent on approval of an NED exception waiver from the Assistant Secretary of the Army for Civil Works [ASA(CW)]. This waiver was approved on 2 September 2020.

There is uncertainty encompassed in the lack of gauged rainfall/runoff data. This uncertainty has been managed through the use of data from adjacent streams in the area and historical account of sediment deposition from Lowell Creek.

C. Is there a significant threat to human life associated with aspects of the study or with failure of the project or proposed project (Type I IEPR - EC 1165-2-217, paragraph 11.d(1)(a) and SAR - paragraph 12.h.)? Yes. The District Chief of Engineering has assessed that the life safety risk of the project is significant; therefore, a Type II IEPR (Safety Assurance Review) will be required.

D. Is the estimated total cost of the project greater than $200 million (EC 1165-2-217, paragraph 11.d(1)(b))? No. The estimated project cost is $150M.

E. Will the study/project require an environmental impact statement (EIS) (EC 1165-2- 217, paragraph 11.d(1)(b))? No. An EIS is not anticipated at this time. A draft EA has been prepared and no unavoidable adverse impacts to environmental resources have been identified.

F. Has the Governor of an affected state requested a peer review by independent experts (EC 1165-2-217, paragraph 11.d(1)(c))? No. There have been no requests by the Governor of Alaska for peer review by independent experts and such a request is not anticipated.

G. Has the Chief of Engineers determined that the project study is controversial due to significant public dispute over the size, nature, or effects of the project or the economic or environmental costs or benefits of the project (EC 1165-2-217, paragraph 11.d(1)(d))? No. The Chief of Engineers has not determined the project study is controversial due to significant public dispute over the size, nature, effects, the economic or environmental costs or benefits of the project.

H. Is the study/project likely to involve significant public dispute as to the project's size, nature, or effects (EC 1165-2-217, paragraph 11.d(1)(e))? No. The project is unlikely to involve significant public dispute as to its size, nature, or effects of the project due to the fact that flood diversion at Lowell Creek has community support. Two public meetings were held in Seward, October 2016. No public dispute on the measures and potential alternatives was raised during these initial meetings. Additional public meetings were held during the public comment period which was concurrent with the first ATR.

I. Is the study/project likely to involve significant public dispute as to the economic or environmental cost or benefit of the project (EC 1165-2-217, paragraph 11.d(1)(f))? No. The project is unlikely to involve significant public dispute as to its size,

nature, or effects of the project due to the fact that flood diversion at Lowell Creek has community support. Two public meetings were held in Seward, October 2016. No public dispute on environmental costs or benefits was raised during these meetings. Additional public meetings were held during the public comment period which was concurrent with the ATR of the Draft Feasibility Report and Environmental Assessment.

J. Is the information in the decision document or anticipated project design likely to contain influential scientific information or be a highly influential scientific assessment – i.e., be based on novel methods, involve innovative materials or techniques, present complex challenges for interpretation, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices (Type I IEPR - EC 1165-2-217, paragraph 11.d(1)(g); SAR paragraph 12.i.(1); and paragraph 15.d)? Yes. The project uses AALL as a metric for project justification. This is a departure from the common current practice of using incremental risk for such justifications. This unique method required a NED exception with approval from the ASA(CW) before the project moves forward. The ASA(CW) approved the NED exception on 2 September 2020. The risk assessment was conducted in accordance with standard USACE practice as found in ER 1110-1-1156 and a consistency review is currently being completed. Project design and implementation techniques will be based on similar flood diversion projects and are unlikely to be precedent setting, unique, or change prevailing practices. The complex situation and analysis associated with the project required a non-standard approach within the HEC-FDA software. The team has worked to incorporate the myriad of situation factors into the models to ensure reasonable estimates of probabilities of events affecting the system and potential damages to Seward and the system itself.

K. Does/will the study/project have significant interagency interest (EC 1165-2-217, paragraph 7.f(1))? No. Reduction of the outfall design length to 150-ft has eliminated unavoidable impacts to threatened and endangered species, and no issues of significant interagency interest exist.

L. Are there any other circumstances that would lead the Chief of Engineers to determine Type I IEPR is warranted (EC 1165-2-217, paragraph 11.d(1)(h))? No, there do not appear to be any circumstances that would lead the Chief of Engineers to determine a Type I IEPR is warranted.

M. Is the project expected to have more than negligible adverse impacts on scarce or unique tribal, cultural, or historic resources (EC 1165-2-217, paragraph 11.d(4)(a))? No. The project area has one known cultural resource. POA cultural resources personnel have coordinated with Alaska State Historic Preservation Office and concluded the project, as planned, will not affect the known resource.

N. Is the project expected to have substantial adverse impacts on fish and wildlife species and their habitat prior to the implementation of mitigation measures (EC 1165-2-217, paragraph 11.d(4)(a))? No. USFWS coordination was completed with the agency stating they would not pursue further investigation under the Fish and Wildlife Coordination Act.

O. Is the project expected to have, before mitigation measures, more than a

negligible adverse impact on an endangered or threatened species or their designated critical habitat (EC 1165-2-217, paragraph 11.d(4)(a))? No. The current design has no unavoidable impacts on endangered or threatened species or designated critical habitat.

P. Does the project study pertain to an activity for which there is ample experience within the USACE and industry to treat the activity as being routine (EC 1165-2-217, paragraph 11.d(4)(b))? The final feasibility report and supporting documentation will contain standard engineering, economic, and environmental analyses and information as well as the unique use of total life safety risk as a CE/ICA metric. The project is for an activity, constructing a flood diversion system, for which there is ample experience within the USACE to treat the activity as being routine. The novel method of life safety risk analysis will be utilized and may develop as a method for analyzing similar projects in the future with life safety concerns, but little or no incremental risk.

Q. Does the project study have minimal life safety risk (EC 1165-2-217, paragraph 11.d(4)(b))? No, as noted above there is a significant life safety risk associated with the project study. While life safety risk is inherent in any flood diversion system, the increased capacity of the proposed project would significantly reduce the total life safety risk residents of Seward now face with the existing system. The residual life safety risk may increase slightly due to the new system's increased capacity behind the structure. With additional capacity, a failure at the structure, however unlikely, could release an increased flow into Seward.

R. Does the project design require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule (EC 1165-2-217, paragraph 12.i.(2))? No. The project design is unlikely to require redundancy, resiliency, and/or robustness, unique construction sequencing, or a reduced or overlapping design/construction schedule. Project design will include leaving the existing flood diversion system in place which will provide some redundancy and provide a higher level of reduction in total life safety risk at minor additional cost because flows will be infrequent and maintenance limited to those infrequent events.

S. Will the project have unique construction sequencing or a reduced or overlapping design construction schedule (e.g., significant project features will be accomplished using the Design-Build or Early Contractor Involvement delivery systems) (EC1165- 2-217, paragraph 12.i.(3))? No. The project is unlikely to have unique construction sequencing or overlapping design construction schedule.

6. REVIEW EXECUTION PLAN

This RP section provides a general description of each type of review and identifies the reviews anticipated for this study/project.

A. Types of Review

(1) District Quality Control (DQC). DQC is an internal review process of basic

science and engineering work products focused on fulfilling the project quality requirements of the project management plan. All DQC reviewers, including Office of Counsel, must be involved at key decision points and should be included throughout project development. Key decision points for DQC review include all decision documents (including data, analyses, environmental compliance documents, etc.) as well as milestone submittals (as required by PB 2018-01).

(2) Agency Technical Review (ATR). ATR is performed to assess whether study/project analyses are technically correct and comply with USACE guidance and whether documentation explains the analyses and results in a clear manner. Further, the ATR team will ensure that proper and effective DQC has been performed (as assessment of which will be documented in the ATR report) and will ensure that the product is consistent with established criteria, guidance, procedures, and policy. If significant life safety issues are involved in a study or project, a safety assurance review should be conducted during ATR. At a minimum, ATR of the draft and final decision documents and supporting analyses is required (EC 1165-2-217, paragraph 9.i.(3)); however, targeted reviews may be scheduled as needed.

(3) Independent External Peer Review (IEPR). Type I 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 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 is made as to whether Type I IEPR is appropriate. If POA anticipates requesting an exclusion from Type I IEPR, that effort should be coordinated with the RMO for assessment prior to submitting to POD for approval. Should IEPR be required, the RMO should be contacted at least three months in advance of the anticipated start of the concurrent review period to allow sufficient time to obtain contract services. If required, Type I IEPR will be managed by an Outside Eligible Organization, external to USACE. Neither the public nor scientific or professional societies would be asked to nominate potential external peer reviewers.

(4) Cost Engineering Review. All decision documents will be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX). The MCX will provide the cost engineering expertise needed on the ATR team and will provide certification of cost estimates. The RMO is responsible for coordinating with the MCX for cost reviews. Cost reviews may occur as part of the draft/final report ATRs but the schedule for specific reviews may also vary. Accordingly, the PDT should coordinate closely review related needs with both the MCX and RMO.

(5) Model Review and Approval/Certification. EC 1105-2-412 established the process and requirements for ensuring the quality of planning models. The EC mandates use of certified or approved planning models for all planning activities to ensure that planning products are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions regarding the availability of data, transparent, and described in sufficient detail to address any limitations of the model or its use.

(6) Policy and Legal Compliance Reviews. All decision documents will be

reviewed throughout the study process for compliance with law and policy. ER 1105-2-100, Appendix H, and DPM CW/DCW memos, provide guidance on P&LCRs. These reviews culminate in determination whether report recommendations, supporting analyses, and coordination comply with law and policy and whether the decision document warrants approval or further recommendation to higher authority by the POD Commander.

(7) Public Review. The POA will post the RMO endorsed and POD approved RP on the POA's public website. Internet posting of the RP provides opportunity for the public to comment on that document. It is not considered a formal comment period, and there is no set timeframe for public comment. The PDT should consider any comments received and determine if RP revisions are necessary. During the public comment period, the public will also be provided with the opportunity to review and comment on the draft and final reports. Should IEPR be required, public comments will be provided to the IEPR panel for consideration.

B. Anticipated Project Reviews and Estimated Costs

Table 1 provides the estimated schedule and cost for reviews anticipated for this study.

Table 1: Lowell Creek Flood Diversion Study, Seward, Alaska – Anticipated Reviews

Product to undergo Review	Review	Start Date	End Date	Cost	Complete
Pre-AMM Milestone Submittals	DQC	01 Sep 2017	07 Sep 2017	$25,000	Yes
Risk Assessment	Consistency Review	15 Dec 2018	08 Jul 2020	$20,000	Yes
Pre-TSP Milestone Submittals	DQC	19 Feb 2020	03 Mar 2020	N/A	Yes
Draft Feasibility Report and Environmental Assessment	DQC	07 May 2020	27 May 2020	$36,000	Yes
	District Legal Review	14 Sep 2020	21 Sep 2020	N/A	Yes
	ATR[1]	27 Jul 2020	04 Sep 2020	$ 82,680	Yes
	P&LCR	21 Sep 2020	14 Oct 2020	N/A	Yes
Pre-ADM Milestone Submittals	DQC	08 Dec 2020	08 Dec 2020	$22,000	No
Final Feasibility Report and Environmental Assessment	DQC	22 Jan 2021	05 Feb 2021	$36,000	No
	ATR	15 Feb 2021	17 Mar 2021	$68,120	No
	DQC[2]	23 Mar 2021	02 Apr 2021	$20,000	No
	District Legal Review	07 Apr 2021	21 Apr 2021	N/A	No
	P&LCR	30 Apr 2021	12 May 2021	N/A	No

[1]ATR durations from start of review to completion of the ATR Summary Report
[2]This DQC is being performed to give District review of the revisions required by the second ATR.

C. District Quality Control

The POA shall manage DQC and will appoint a DQC Lead to oversee that review (see EC 1165-2-217, section 8.a.1).

(1) Review Team Expertise. Table 2 identifies the required DQC team expertise.

Table 2: Required DQC Expertise

DQC Team Disciplines	Expertise Required
DQC Lead	A senior professional with extensive experience preparing Civil Works decision documents and conducting DQC. The lead may also serve as a reviewer for a specific discipline (such as planning, economics, environmental resources, etc.).
Plan Formulation	A senior water resources planner with experience in flood risk management.
Economics	A senior economist with experience with flood risk management and CE/ICA. The reviewer should also have familiarity with the economic models identified in Table 4, including life safety consequences using HEC-LifeSim.
Environmental Resources	Expertise in evaluating the impacts associated with flood risk management. Should also be experienced with environmental coordination, National Environmental Policy Act (NEPA) requirements, Endangered Species Act (ESA) requirements, and the Marine Mammal Protection Act (MMPA).
Cultural Resources	Expertise in evaluating the impacts associated with flood risk and dredging, as well as familiarity with environmental coordination and NEPA/National Historic Preservation Act (NHPA).
Hydrology and Hydraulics (H&H) Engineer	Expert in the field of riverine hydraulics and have a thorough understanding of tunnel hydrology. A registered professional engineer is recommended. The reviewer should also have familiarity with the hydrology and hydraulics model identified in Table 5.
Geotechnical Engineer	Experienced in geotechnical investigation practices including soil classification and tunnel and diversion structure design. A registered, professional engineer is recommended.
Cost Engineering	Familiar with cost estimating using the Microcomputer Aided Cost Engineering System (MCACES) model and preparation of an MII Cost Estimate. The reviewer will be Certified Cost Technician, Certified Cost Consultant, or Certified Cost Engineer. The reviewer should also have familiarity with the cost engineering models identified in Table 5.
Real Estate	The real estate reviewer will be experienced in Federal Civil Works real estate law, policy, and guidance, development of Real Estate Plans for Civil Works studies.
Office of Counsel	Legal expert with experience reviewing planning documents to ensure legal sufficiency.
Dam Safety Officer (DSO)	Per PB 2019-04, if a study proposes modification to existing dams or new dam, the DQC review team will include the dam safety officer to review requirements related to life safety and risk assessments in coordination with the Dam Safety Program Manager (DSPM).

(2) Documentation of DQC. Quality Control should be performed continuously

throughout the study. Certification of DQC completion is required at the draft and final report stages. Documentation of DQC should follow the POA Quality Manual and the POD Quality Management Plan. An example DQC Certification statement is provided in EC 1165-2-217 (Figure F). DrChecks software will be used to document DQC review (comments, responses, and issue resolution).

Documentation of the completed DQC review (i.e., all comments, responses, issue resolution, and DQC certification) will be provided to the POD, RMO, and ATR Team leader prior to initiating an ATR/subsequent reviews. The ATR team will assess the quality of the DQC performed and provide a summary of that assessment in the ATR report. Missing or inadequate DQC documentation can result in the start of subsequent reviews being delayed (see EC 1165-2-217, Section 9).

D. Consistency Review

A consistency review of the risk assessment was conducted by a team USACE Risk Cadre members. The team reviewed the risk assessment for adherence to standard USACE practices within the dam safety community for conducting risk assessments. Comments were received and addressed. A final version of the assessment has been submitted for certification. A list of team members for consistency review is included in Attachment 1.

E. Agency Technical Review

ATR will be performed on the draft and final decision documents and supporting analyses (EC 1165-2-217, paragraph 9.i.(3)). The RMO will manage the ATR. ATR will be performed by a qualified team from outside the POA that is not involved in the day- to-day production of the project/product. ATR will be performed by a team whose members are certified or approved by their respective Communities of Practice (CoPs) to perform reviews. The RMO will identify an ATR lead and ATR team members.

The ATR team lead will be from outside POD. The ATR team lead is expected to participate in the study's milestone meetings (PB 2018-01), the cost of which is not included in the estimates provided in Table 1.

(1) Review Team Expertise. Table 3 identifies the anticipated disciplines and ATR team expertise required for study efforts.

Table 3: Required ATR Team Expertise

ATR Team Disciplines	Expertise Required
ATR Lead	The ATR lead will be a senior professional with extensive experience preparing Civil Works decision documents and conducting ATR. The lead should have the skills to manage a virtual team through an ATR. The lead may serve as a reviewer for a specific discipline (e.g., plan formulation, economics, etc.).
Plan Formulation	A senior water resources planner with experience in flood diversion projects and SMART planning.
Economics	A senior economist with experience with flood diversion projects and CE/ICA. A second reviewer should have expertise with the types of economic models identified in Table 4 including life safety

ATR Team Disciplines	Expertise Required
	analyses. More than one reviewer may be required to satisfy this review, with expertise required in the following areas: - Flood risk management and National Economic Development (NED) analysis - Cost effectiveness and incremental cost analysis (CE/ICA) - Life safety analysis.
Environmental Resources	Expertise In evaluating the impacts associated with flood diversion. Should also be experienced with environmental coordination, NEPA requirements, ESA requirements, MMPA.
Cultural Resources	Expertise in evaluating the cultural impacts associated with flood diversion and dredging, as well as familiarity with environmental coordination and NEPA/NHPA.
H&H Engineer(s)	At least two reviewers, one external and one internal to the USACE, are required for this project to cover the required expertise: - Expertise in the field of riverine, tunnel flood hydraulics and design of hydraulic structures. A registered professional engineer is recommended. - Expertise with flow frequencies and translation of flow data between adjacent basins. A registered professional engineer is recommended. - Expertise with landslides and surge flows specific to the project area. The reviewers should also have expertise with HEC-RAS.
Construction Engineering	Experienced in construction engineering with regards to tunnels and flow diversion systems. A registered, professional engineer is recommended.
Geotechnical Engineer / Geologist*	At least two reviewers are required for this project to cover the required expertise, one internal and one external to the USACE: - Expertise in geotechnical investigation practices including and tunnel and diversion structure design. A registered, professional engineer is recommended. - Expertise in geology with experience and knowledge of landslides. - Experience/expertise with probable failure modes analysis (PFMA).
Tunneling*	A reviewer external to the USACE experienced in tunnel design and construction. A registered, professional engineer or geologist is recommended. This may be covered by H&H, or geotechnical engineering reviews.
Cost Engineer	Familiar with cost estimating using the MCACES model and preparation of an MII Cost Estimate. The reviewer will be Certified Cost Technician, Certified Cost Consultant, or Certified Cost Engineer. Coordination with the Cost Engineering MCX will be required for their selection of the cost engineering reviewer and to obtain Cost Engineering MCX certification of the cost estimate. The reviewer should also have expertise with the cost engineering models identified in Table 5.
Real Estate	The real estate reviewer will be experienced in Federal Civil Works real estate law, policy, and guidance, development of Real Estate Plans for Civil Works studies.
Climate Preparedness and Resilience Reviewer	A member of the Climate Preparedness and Resiliency CoP reviewer will participate on the ATR team. The reviewer will have experience with climate change and relative sea level change models and analysis.
Risk and Uncertainty	A subject matter expert in multi-discipline flood risk analysis to ensure consistent and appropriate identification, analysis, and written communication of risk and uncertainty to include compliance with in ER 1105-2-101.

**Task order seeking external reviewer with this experience is being issued. Experience for the reviewer required in the task order: The senior geotechnical engineering and/or geologist Review Panel Member should have demonstrated engineering or geology experience or combined equivalent of education and experience in geotechnical-civil design, geotechnical and geology evaluation of FRM projects. The panel member must be a*

registered professional engineer or geologist from academia, a public agency, or an A-E or consulting firm. Candidate must have demonstrated experience related to geotechnical and/or geology practices for design and construction of FRM projects (to include evaluation and recommendations regarding tunneling and mitigation for PFMs identified in Section 2 (of task order). The panel member should have experience in risk analysis. Active participation in related professional engineering, geologic and scientific societies is encouraged."

(2) Documentation of ATR. DrChecks will be used to document ATR comments, responses, and issue resolution. Comments should be limited to those needed to ensure product adequacy. All members of the ATR team should use the four part comment structure (EC 1165-2-217, Section 9(k)(1)). If a concern cannot be resolved by the ATR team and PDT, it will be elevated to the vertical team for resolution using the issue resolution process identified in EC 1165-2-217. The comment(s) can then be closed in DrChecks by noting the concern has been elevated for resolution. The ATR Lead will prepare a Statement of Technical Review Report (see EC 1165-2-217, Section 9), for both draft and final decision documents. Any unresolved issues will be documented in the ATR report prior to certification. The Statement of Technical Review (ATR completion) should always include signatures from the ATR lead, project manager, and RMO, and the Certification of ATR should always include signatures from the District's Chiefs of Engineering and Planning Divisions.

F. Independent External Peer Review

(1) Decision on 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.

Based upon the criteria identified in EC 1165-2-217 and the scope of the study, *the study does not require Type I IEPR*. Type I IEPR is not warranted based on consideration of the following:

The decision document does not meet any of the mandatory triggers for Type I IEPR in the 5 April 2019 DCW memorandum as described in detail in Section 5 of this RP: the estimated total cost of the project is approximately $150M, which is less than the $200M trigger; the Governor of Alaska has not requested peer review by independent experts; and the Chief of Engineer's has not determined that the project study is controversial due to significant public dispute over either the size, nature, or effects of the project or the economic or environmental costs or benefits of the project.

As noted in the DCW memorandum, when the study does not meet any of the three mandatory triggers for IEPR, the Major Subordinate Command (MSC) Commanders have the discretion to conduct IEPR based on a risk informed assessment of the expected contribution of IEPR to the project. A risk informed assessment to not perform Type I IEPR considered the following factors.

- The PDT has already engaged in thorough review of models and methodology used in

the study within the enterprise, including the RMC, FRM-PCX and Walla Walla District, and with external reviewers from the National Weather Service and a contracted private consultant during the robust ATR to ensure methods and models are being used and interpreted correctly. The AALL metric was developed by the PDT team, scrutinized at all levels of USACE and approved by ASA(CW) as well as the utilization of the metric being reviewed within the enterprise and by external reviewers during the robust ATR and public and policy review.

- The life safety risk associated with this study is a pre-existing condition that has been ever present in the area. Any life safety risk presented by a failure of the project would not be greater than the pre-existing condition. While a failure at the structure, however unlikely, may release an increased flow into Seward compared to that which would be released if the current structure failed or was overwhelmed, it would overall be no greater than flows into Seward before the current structure was constructed. As noted, due to the presence of the life safety risk, a Type II IEPR will be performed during PED.

- Though unique analysis was utilized for the study, the project itself, tunneling and constructing a diversion structure, are activities in which USACE are very proficient. The methods anticipated to be used are similar to those used for construction of the current system albeit incorporating technological advancements achieved within the past 80 years.

- As there are life safety concerns and due to the unique analysis for the study, the FRM-PCX indicated that while a Type I IEPR is not mandatory, the project would benefit from a more robust review than a normal ATR. Considering this, and at the suggestion of the FRM-PCX, a robust ATR with external experts has been conducted.

- The scope of the project is limited to one watershed in a multi-watershed pinch point, thus while addressing the issues presented by the single watershed, the project in isolation has a limited impact in the area as a whole.

- There are no known protected environmental resources within the project area.

With these factors considered, a Type I IEPR would only provide duplicity adding little more to the study than previous reviews while requiring a 3x3 waiver and additional costs to the study. The FRM-PCX concurs with the level and scope of review identified and supported in the review plan, including the exclusion of the study from IEPR. In lieu of IEPR, the ATR included experts from outside USACE who provided a rigorous review of the technically challenging aspects of this study, with a specific focus on the hydrology, hydraulic, and geotechnical analyses. The FRM-PCX provided an endorsement memo incorporating this robust ATR dated 13 May 2020.

(2) Decision on Type II IEPR. Type II IEPR, Safety Assurance Review, is managed outside of the USACE and is performed on design and construction activities for any project where potential hazards pose a significant threat to human life. For Type II IEPRs, a panel is convened to review the design and construction activities before construction begins and periodically thereafter until construction activities are completed.

Due to the life safety concerns identified for this project, a Type II IEPR is appropriate for this project. The Type II IEPR will be conducted during the Preconstruction, Engineering, and Design (PED) Phase of the project prior to the initiation of any construction.

G. Model Certification or 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 are any models and analytical tools used to define water resources management problems and opportunities; to formulate potential alternatives to address study area problems and take advantage of 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 a planning product. The selection and application of the model and assessment of input and output data is the responsibility of the users and is subject to DQC, ATR, and IEPR (if required). The following models may be used to develop the decision document.

Table 4: Planning Models

Model Name and Version (discipline to apply)	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
Regional Economic System (RECONS) v 2.0	RECONS is a regional economic impact modeling tool that estimates jobs, income, sales and value added associated with Corps Civil Works spending and additional economic activities. The model will be used to measure impacts of project implementation of the selected plan to the local Seward economy for use by the Sponsor.	Certified
IWR Planning Suite v. 2.0.9	IWR-Planning Suite is a water resources investment decision support tool originally built for the formulation and evaluation of ecosystem restoration alternative plans; however, it is now more widely used by all USACE business lines for evaluation of actions involving monetary and non-monetary cost and benefits. This model will be utilized to conduct cost effectiveness and incremental cost analysis (CE/ICA) using life safety metrics.	Certified
HEC-FDA v 1.4.2	The program integrates hydrologic engineering and economic analysis to formulate and evaluate plans using risk-based analysis methods. It will be used to evaluate/compare plans to aid in selecting a recommended plan.	Certified
HEC-LifeSim 1.01	The program is designed to simulate the entire warning and evacuation process for estimating potential life loss estimates resulting from catastrophic floods. It will be used to estimate life loss at different flow rates and incorporating surge flow.	Certified for life loss evaluation.

Model Name and Version (discipline to apply)	Brief Model Description and How It Will Be Used in the Study	Certification / Approval
Economics Debris Damages Avoided Spreadsheet	The spreadsheet is used to calculate damages prevented related to debris clean up at the outfall.	The spreadsheet will be reviewed during ATR and subject to Planning Model single use approval by the FRM-PCX in accordance with EC 1105-2-412.

EC 1105-2-412 does not address engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue. The professional practice of documenting the application of the software and modeling results will be followed. The USACE Scientific and Engineering Technology Initiative has identified many engineering models as preferred or acceptable for use in studies. These models should be used when appropriate. The selection and application of the model and the input and output data is the responsibility of the user and is subject to DQC, ATR, and IEPR (if required). The following models may be used to develop the decision document.

Table 5: Engineering Models

Model Name and Version (discipline to apply)	Brief Model Description and How It Will Be Used in the Study	Model Certification / Acceptance Status
HEC-RAS v 5.0.3 (Hydraulics)	The software performs 1-D steady and unsteady flow river hydraulics calculations and has capability for 2-D (and combined 1-D/2-D) unsteady flow calculations. It will be used for steady flow analysis to evaluate the future without-project and future with-project conditions.	HH&C CoP Preferred Model
Abbreviated Risk Analysis, Cost Schedule Risk Analysis (Cost Engineer)	Cost risk analyses identify the amount of contingency that must be added to a project cost estimate and define the high risk drivers. The analyses will include a narrative identifying the risks or uncertainties. During the alternatives evaluation, the PDT will assist the cost engineer in defining confidence/risk levels associated with the project features within the abbreviated risk analysis. For the Class 3 estimate, an evaluation of risks will be performed using Crystal Ball Cost Schedule Risk Analysis for construction costs over $40 million or the Abbreviated Risk Analysis for projects under $40 million.	CW Cost Engineering MCX mandatory

Model Name and Version (discipline to apply)	Brief Model Description and How It Will Be Used in the Study	Model Certification / Acceptance Status
Total Project Cost Summary (TPCS) (Cost Engineer)	The Cost CX requires the TPCS be submitted for either division or HQUSACE approval. The Total Project Cost for each CW project includes all Federal and authorized non-Federal costs represented by the CW Work Breakdown Structure features and respective estimates and schedules, including the lands and damages, relocations, project construction costs, construction schedules, construction contingencies, planning and engineering costs, design contingencies, construction management costs, and management contingencies. It is required for certified costs with the final report. It contains indices with which escalation is calculated.	CW Cost Engineering MCX mandatory

H. Policy and Legal Compliance Reviews (P&LCRs)

In accordance with DPM CW 2018-05, P&LCRs for draft and final planning decision documents are delegated to the MSC responsible for the execution of the study.

With input from POD and Headquarters, USACE (HQUSACE) functional leaders and through collaboration with the Chief of Office of Water Project Review (OWPR), the POD Chief of Planning and Policy is responsible for establishing a competent interdisciplinary P&LCR team (DPM 2019-01). The composition of the policy review team will be drawn from HQUSACE, the POD, the PCX, and other review resources as needed. The identification of Office of Counsel members will follow the procedures set forth by the HQUSACE Chief Counsel, as coordinated by HQUSACE and POD Office of Counsel functional leaders. The POD Chief of Planning and Policy and the Chief of OWPR will collaborate to identify and endorse a P&LCR Manager from among the P&LCR team identified for the study. The manager may be a POD, PCX, or HQUSACE employee. The team is identified in Attachment 1 of this RP. The P&LCR team will:

- Provide advice and support to the PDT and decision makers at the POA, POD, HQUSACE, and Assistant Secretary of the Army for Civil Works levels.

- Engage at both the POD and HQUSACE levels, ensuring that the vertical teaming aspect of SMART planning is maintained.

- Help guide PDTs through project development and the completion of policy and legally compliant documents, identifying policy and legal issues as early as possible such that issues can be addressed while minimizing impacts to study and project costs and schedules.

- Provide impartial and unbiased recommendations, advice, and support to decision makers.