

REVIEW PLAN

**Ala Wai Canal Flood Risk Management
Island of Oahu, Hawaii
Feasibility Study Report and Integrated Environmental Impact Statement (EIS)
Honolulu District (POH)**

MSC Approval Date: 28 December 2012

Last Revision Date: 13 January 2016



**US Army Corps
of Engineers®**

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1. PURPOSE AND REQUIREMENTS

- **Purpose.** This Review Plan defines the scope and level of peer review for the Ala Wai Canal Flood Risk Management Feasibility Study Report and Integrated EIS.

- **References**

- (1) Engineering Circular (EC) 1165-2-214, Civil Works Review Policy, 15 December 2012
- (2) EC 1105-2-407, Assuring Quality of Planning Models, 31 March 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 (PMP) for the study

- **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).

- (1) District Quality Control/Quality Assurance (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). 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 Major Subordinate Command (MSC).

- (2) 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 US Army Corps of Engineers (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 a designated Risk Management Organization (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. To assure independence, the leader of the ATR team shall be from outside the home MSC.

- (3) 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 is generally for decision documents and Type II is generally for implementation products.

- 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 an biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all the 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.
- (b) 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.
- (4) Policy and Legal Compliance Review. All **decision documents** will be reviewed throughout the study process for their 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. 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 in decision documents.
- (5) Cost Engineering Review and Certification. All **decision documents** shall be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX), located in the Walla Walla District. The MCX, or in some circumstances regional cost personnel that are pre-certified by the MCX, will conduct the cost ATR. The MCX will provide certification of the final total project cost.

- (6) Model Certification/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. 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. Use of engineering models is also subject to DQC, ATR, and IEPR.

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) 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 Flood Risk Management Center of Expertise (FRM-PCX).

The RMO will coordinate with the Cost Engineering Directory of Expertise (DX) to conduct ATR of cost estimates, construction schedules and contingencies.

3. STUDY INFORMATION

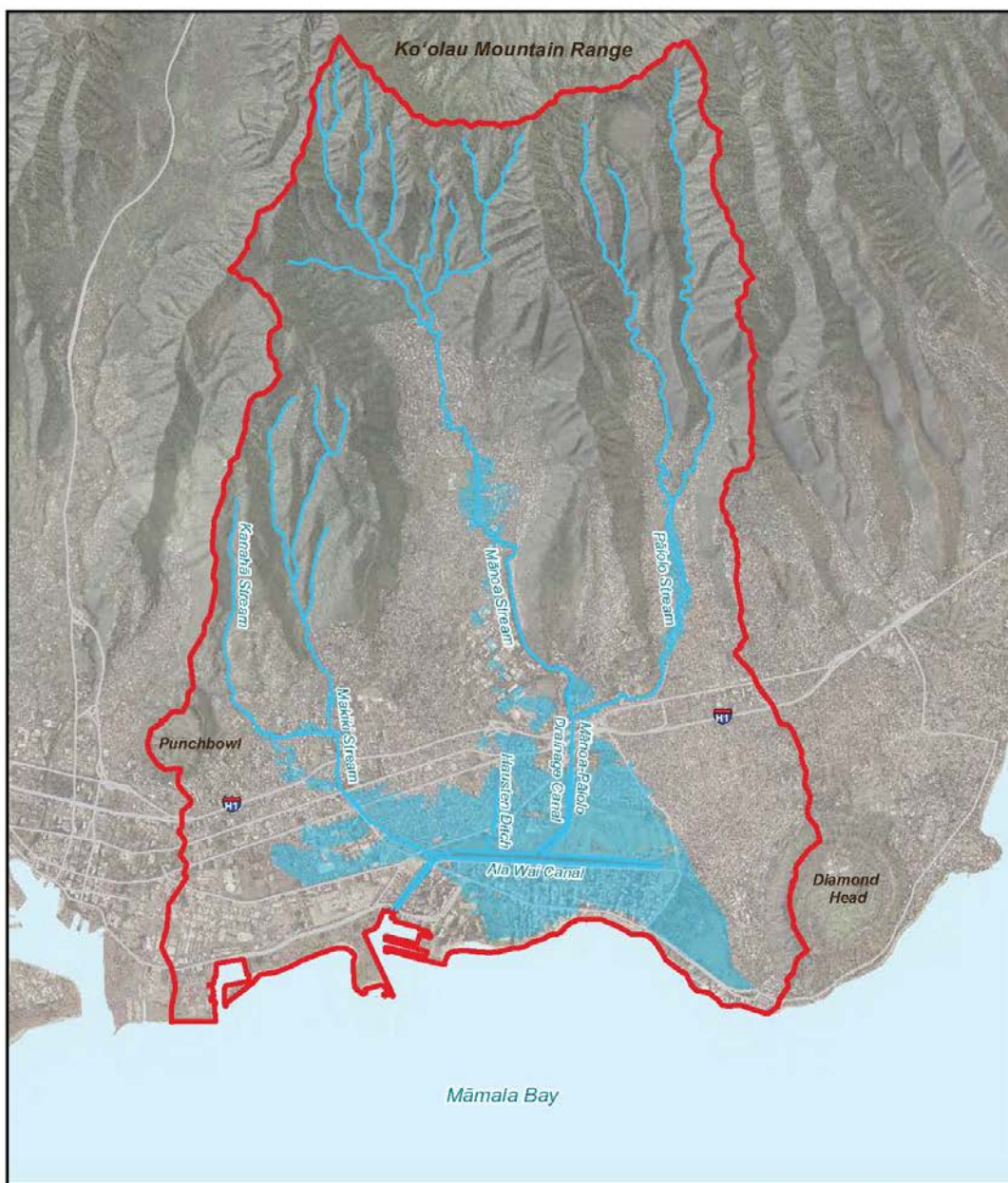
- **Decision Document.** The Decision Document for the Ala Wai Canal Flood Risk Management Study is comprised of a Feasibility Study Report with an integrated Environmental Impact Statement (EIS) document to satisfy National Environmental Policy Act (NEPA) requirements. The Decision Document will require approval by the Chief of Engineers and, if approved, Congressional authorization.

Study/Project Description. The purpose of the Ala Wai Canal Flood Risk Management Study is to investigate opportunities for reduction of riverine flood risks within the Ala Wai basin. The Ala Wai Watershed is located on the southeastern side of the island of Oahu, Hawaii. The watershed encompasses 19 square miles (mi²) (12,064 acres) and extends from the ridge of the Koolau Mountains to the nearshore waters of Mamala Bay. It includes Makiki, Manoa, and Palolo streams, which flow to the Ala Wai Canal, a 2-mile-long, man-made waterway constructed during the 1920s to drain extensive coastal wetlands. This construction and subsequent draining allowed the development of the Waikiki District. The study area is shown in Figure 1.

The Ala Wai Watershed contains approximately 200,000 residents, and is the most densely populated watershed in Hawaii. The upper portion (approximately 7.5 mi² or 40 percent of

the watershed) is zoned as Conservation District, which is intended to protect natural and cultural resources, including the island's aquifer. The remaining approximately 11 mi² of the middle and lower watershed is heavily urbanized, supporting a high density of single-family residences, condominiums, hotels and businesses, as well as many public and private schools, including the University of Hawaii at Manoa (UH), the largest university in the state. Within this urban footprint, the population density is one of the highest in the nation with 12.36 persons per urbanized acre (Fulton et al., 2001). In addition to a variety of residential, commercial, and institutional development, the watershed also includes the Waikiki District, a prime tourist destination that attracts more than 79,000 visitors per day. In large part because of the tourism industry, Waikiki is the primary economic engine for the state, providing 7 percent of the gross state product, 7 percent of the civilian jobs in the state, and 9 percent of the State and County tax revenue (DBEDT, 2013).

The siting of structural and non-structural improvements to address flood risk is primarily focused on the major tributaries to the Ala Wai canal as well as the floodplain of the canal itself. In the upper watershed, streams are in a natural, generally unaltered state. As streams convey water downstream, they flow through increasingly denser urban areas prior to reaching the Ala Wai Canal. The high gradient slopes of the streams produce flashy runoff following storm events. Much of the focus of the study is centered on reducing the magnitude of the hydrograph in the upper watershed and reducing the frequency of bank overtopping along the canal in the lower watershed.



- LEGEND**
- Stream
 - Watershed Boundary
 - 100-Year Floodplain (USACE)
 - Major Road

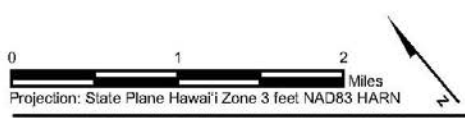


FIGURE ES-2
1-Percent Chance (100-Year)
Flood Inundation Map
 Ala Wai Watershed Project
 O'ahu, Hawai'i

CH2MHILL

Figure 1. Study Area for Ala Wai Canal Flood Risk Management Study – Without Project 1% ACE Floodplain outlined in blue.

A wide range of alternative measures were identified to address the planning objectives of the study. Management measures generally targeted achieving improvement in the hydrologic condition or flood risk in five areas:

1. Peak flow reduction
2. Increase in conveyance capacity
3. Debris management
4. Channel maintenance
5. Non-structural flood risk management

The tentatively selected plan consists of the following components:

Flood Risk Management Measure	Description
Waihi Debris and Detention Basin	Earthen dam, approximately 24 feet high and 225 feet across; arch culvert to allow small storm flows to pass; concrete spillway above culvert with grouted rip rap on upstream and downstream side; debris catchment feature located on upstream end of culvert. New access road to be constructed for construction and O&M.
Waiakeakua Debris and Detention Basin	Earthen dam, approximately 20 feet high and 185 feet across; arch culvert to allow small storm flows to pass; concrete spillway above culvert with grouted rip rap on upstream and downstream side; debris catchment feature located on upstream end of culvert; energy dissipation structure to be located on downstream end of culvert.
Woodlawn Ditch Detention Basin	Three-sided berm, approximately 15 feet high and 840 feet across; arch culvert to allow small storm flows to pass; concrete spillway above culvert with grouted rip rap on upstream and downstream side.
Mānoa In-stream Debris Catchment	Concrete pad, approximately 8 feet wide and 60 feet across; steel posts (up to approximately 7 feet high) evenly spaced 4 feet apart along concrete pad.
Kanewai Field Multi-Purpose Detention Basin	Earthen berm, approximately 7 feet high, around 3 sides of the field; grouted rip rap inflow spillway along bank of Mānoa Stream to allow high flows to enter the basin; existing drainage pipe at south end of basin to allow water to re-enter stream.
Wai'ōma'o Debris and Detention Basin	Earthen dam, approximately 24 feet high and 120 feet across; arch culvert to allow small storm flows to pass; concrete spillway above culvert, with grouted rip rap on upstream and downstream side; debris catchment feature located on upstream end of culvert. Excavation of approx. 2,000 yd ³ to provide required detention volume upstream of berm; low-flow channel with existing substrate to be restored following excavation. New access road to be constructed for construction and O&M.
Pūkele Debris and Detention Basin	Earthen dam, approximately 24 feet high and 120 feet across; arch culvert to allow small storm flows to pass; concrete spillway above culvert with grouted rip rap on upstream and downstream side; debris catchment feature located on upstream end of culvert. New access road to be constructed for construction and O&M.
Makiki Debris and Detention Basin	Earthen dam, approximately 24 feet high and 100 feet across; arch culvert to allow small storm flows to pass; concrete spillway above culvert with grouted rip rap on upstream and downstream side; debris catchment feature located on upstream end of culvert. New access road to be constructed for construction and O&M.
Ala Wai Canal Floodwalls	Concrete floodwalls ranging up to approximately 4 feet high, offset from existing Canal walls. Existing stairs to be extended and new ramps to be installed to maintain access to Canal; floodgate to be installed near McCully Street. Three pump stations to accommodate storm flows and gates installed at existing drainage pipes to prevent backflow from the Ala Wai Canal during a flood event.
Hausten Ditch Detention Basin	Concrete floodwalls and an earthen berm (approximately 4.3 feet high) to provide detention for local drainage; install concrete wall with four slide gates adjacent to the upstream edge of the existing bridge to prevent a backflow from the Ala Wai Canal during a flood event.
Ala Wai Golf Course Multi-Purpose Detention Basin	Earthen berm, up to approximately 7 feet high, around the north and east perimeter of the golf course; grouted rip rap inflow spillway along bank of Mānoa-Pālolo Drainage Canal to allow high flows to enter the basin; sediment basin within western portion of golf course; floodgate across the main entrance road; passive drainage back into Ala Wai Canal.
Floodwarning System	Installation of 3 real-time rain gages (Mānoa, Makiki, and Pālolo streams) and 1 real-time streamflow or stage gage (Ala Wai Canal) as part of flood warning system for Ala Wai Watershed.

The estimated cost of the tentatively selected plan totals approximately \$173 million.

- **Factors Affecting the Scope and Level of Review.** It has been determined that:
 - Implementation of the proposed measures may be challenging because many of these measures, especially multi-purpose detention basins, have not been implemented in Hawaii. Detention basins have, however, been utilized extensively in the mainland, U.S. Adjusting these measures to the constrained space and flashy conditions of the watershed will be technically challenging but feasible from an engineering standpoint. The community and sponsors will have institutional and social challenges with the multipurpose aspect of these measures, balancing recreational services with public safety;
 - Because the watershed is heavily urbanized, residual public safety risks associated with the proximity of residents and businesses to the FRM measures are likely;
 - The project does involve significant threat to human life/safety, but will improve on the current condition within the study area;
 - The project/study is not likely to have significant interagency interest and has significant support from the State of Hawaii Department of Lands and Natural Resources, the non-federal sponsor;
 - The project/study will not likely be controversial: the non-federal sponsor has conducted significant public outreach and has demonstrated broad public support for the project. The Governor of the State of Hawaii has not requested additional external review. Property owners directly affected by land acquisitions will likely not be supportive of the study;
 - The project report is not likely to contain influential scientific information or be a highly influential scientific assessment;
 - The proposed project design is not based on novel methods, involve the use of 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;
 - The proposed project design will not require redundancy, resiliency, and/or robustness; and
 - The proposed project does not employ unique construction sequencing or a reduced or overlapping design construction schedule.
- **In-Kind Contributions.** Products and analyses provided by non-Federal sponsors as in-kind services are subject to DQC, ATR, and IEPR. The in-kind products and analyses to be provided by the non-Federal sponsor include:
 - (1) Public outreach and stakeholder input
 - (2) Compilation of without-project socio-economic conditions within the study area
 - (3) Conceptual designs of management measures and non-structural elements
 - (4) Field surveys of biological and environmental site conditions within the study area
 - (5) Drainage, hydrologic and geomorphic studies within the study area

4. DISTRICT QUALITY CONTROL (DQC)

- **Documentation of DQC.** All decision documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC on draft and final products. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the PMP. Official comments shall be received in ProjNet/Dr. Checks. The POH shall manage the DQC process, however, given the available resources within

POH, other USACE Districts may be solicited to provide DQC services. Documentation of DQC activities is required and should be in accordance with the POH and the POD Quality Manuals.

5. AGENCY TECHNICAL REVIEW (ATR)

- **Products to Undergo ATR.** The draft and final decision documents will undergo ATR, including all environmental documentation and technical appendices. This ATR review is intended to identify technical issues with the Feasibility Study Report prior to the Agency Decision Milestone (ADM). ATR review must cover the draft Feasibility Study Report and integrated EIS (including NEPA and supporting documentation).

An ATR was previously completed, prior to the Feasibility Scoping Meeting (FSM) Milestone. The study has since been rescoped from a multi-purpose study to one that focuses specifically on flood risk management. An ATR will be completed on the draft and final Feasibility Study and Integrated EIS, and will be conducted as follows:

1. ATR review of entire document prior to the Agency Decision Milestone (ADM), by all disciplines; provide comments in Dr. Checks.
2. Review of comments, responses by the PDT and ATRT focused on how the comment will be addressed in the final version of the report and the schedule for completion of the revisions and/or technical analysis.
 - 2a. Critical or High Significance Comments will require ATRT and PDT resolution and agreed strategy forward before the ADM with Vertical Team awareness and tracking in the Risk Register.
 - 2b. All comments/responses and revisions to the document shall be coordinated with the ATRT for ATR backcheck and closure as revisions are made. Revisions/resolutions to document shall be done in timely manner, and must be resolved and closed as comments/response revisions are completed.
 - 2c. Communication and coordination is critical between the PDT Lead and the ATRT Lead.
3. Submittal of all Dr. Checks comments/responses shall be part of the ATR Report to the PDT and HQ-USACE for the ADM milestone.
4. Completion of any additional technical analyses or report edits after ADM shall be completed and any remaining Draft Report backchecks will be coordinated for closure before the Final Report. The Risk Register shall be updated as needed.
5. Final decision document ATR will focus on changes to or new information included in the document since review of the draft. This final decision document ATR is included in the study schedule and budget.
6. The ATRT Lead shall prepare an ATR Report to document the ATR of the draft and final decision documents and will prepare two Statement(s) of Technical Review in accordance with EC 1165-2-214, the final of which will be included as part of the Final Report submittal package for CWRB.

- **Required ATR Team Expertise.** Expertise required for the ATR Team is detailed below:

ATR Team Members/Disciplines	Expertise Required
ATR Lead/Plan Formulation Reviewer	The ATR lead should be a senior professional with extensive experience in preparing Civil Works decision documents and conducting an ATR. The lead should also have the necessary skills and experience to lead a virtual team through the ATR process. The ATR lead will also serve as a reviewer for plan formulation. The ATR lead must be outside of the POD, and should be a senior water resources planner with experience in FRM projects in urban settings.
Economics	The Economics reviewer should be a senior economist with experience in FRM economics, environmental mitigation, HEC-FDA and IWR Planning Suite. The review will also serve as the subject matter expert for flood risk analysis and risk reviewer. The risk analysis reviewer will be experienced with performing and presenting risk analyses in accordance with ER 1105-2-101 and other related guidance, including familiarity with how information from the various disciplines involved in the analysis interact and affect the results.
Environmental Compliance	The Environmental Resources reviewer should be a senior environmental planner or specialist with experience in complex FRM projects in urban settings. The reviewer should have experience with the following regulatory authorities: NEPA – specifically EIS compliance, CWA Section 404(b)(1) analysis, FWCA, and compliance with EO 11988 for flood plain management. Familiarity with tropical systems is also required. In addition, this Reviewer should have experience in evaluating compensatory mitigation involving Habitat Evaluation Procedures (HEP) associated with flood risk management.
Hydraulic Engineering	The Hydraulic Engineering reviewer will be an expert in the field of hydraulics and have a thorough understanding of knowledge of open channel dynamics, enclosed channel systems and computer modeling techniques associated with HEC-RAS (steady/unsteady flow modeling). Experience with flood risk in mountainous and urbanized watersheds is critical. The reviewer should be familiar with application of detention/retention basins, application of flood walls, non-structural solutions involving flood warning systems and flood proofing, etc and/or computer modeling techniques that will be used such as HEC-RAS, or Hydraulics and HEC-HMS. The reviewer should be familiar with EO 11988 Floodplain Management Analysis.
Cultural Resources	The Cultural Resources reviewer should be experienced with NHPA consultation especially for historic structures as well as the archaeology and cultural history of the Pacific Islands.
Civil/Structural Engineering	The Civil/Structural Engineering reviewer should have an extensive experience in FRM structures, including debris basins,

	floodwalls, in settlement evaluation of the structures, and design and analysis of structures, including pump stations.
Cost Engineering	The Cost Engineering reviewer must be experienced in design requirements for standard flood risk management measures.
Real Estate	Reviewer must be experienced in civil works real estate laws, policies and guidance and experience working with sponsor real estate issues.

- **Documentation of ATR.** DrChecks 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 DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, 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 DrChecks 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) for both the draft and final report ATR reviews. A sample Statement of Technical Review is included in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

- **Decision on IEPR.** Application of an IEPR requires a risk informed decision considering the following factors (Appendix D of EC 1165-2-214):
 - The consequences of non-performance on project economics, the environmental and social well-being (public safety and social justice);
 - whether the product is likely to contain influential scientific information or be highly influential scientific assessment; and
 - if and how the decision document meets any of the possible exclusions described in Paragraph 11.d.(3) and Appendix D of EC 1165-2-214, detailed below:
 - (i) No Environmental Impact Statement (EIS);
 - (ii) Project is not controversial;
 - (iii) Negligible adverse impacts on scarce or unique cultural, historic, or tribal resources;
 - (iv) No substantial adverse impacts on fish and wildlife and their habitat prior to mitigation; and
 - (v) Before mitigation, only negligible adverse impact on a species listed as endangered or threatened
 - Mandatory triggers for IEPR include the following:
 - (i) Significant threat to human life/safety
 - (ii) Estimated cost exceeding \$45 million
 - (iii) Where a request is received by a Governor of a State
 - (iv) Where Deputy of Civil Works or Chief of Engineers determines that the project study is controversial due to a public dispute
 - (v) Where the head of a Federal agency determines that the project is likely to have a significant adverse effect on environmental, cultural or other resources under the jurisdiction of the agency
- Because the Project meets the mandatory triggers Type I IEPR will be required for the feasibility phase. A safety assurance review (SAR) is incorporated into the Type I IEPR. Type II IEPR will be conducted during the design phase of the study.
- **Products to Undergo Type I IEPR.** IEPR will be completed on the draft Feasibility Study, the Integrated EIS, and associated appendices.
- **Documentation of Type I IEPR.** An IEPR report will be completed by an outside eligible contractor (OEO). The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-209, 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 4.d 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.
 - **Required Type I IEPR Panel Expertise.** Expertise required for the IEPR Panel is detailed below:

IEPR Team Members/Disciplines	Expertise Required
Civil Works Plan Formulation Reviewer/Economist	The Panel Member should be from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with a minimum of 10 years demonstrated experience in public works planning. Panel Member must be very familiar with USACE plan formulation process, procedures, and standards as they relate to flood risk management. The Panel Member shall have a minimum of five years experience directly dealing with the USACE six-step planning process, which is governed by ER 1105-2-100, Planning Guidance Notebook. In addition, the Panel Member should have experience related to economic evaluation of traditional National Economic Development (NED) plans, National Ecosystem Restoration (NER) plan benefits associated with flood risk management projects, and have experience with Cost Effectiveness/Incremental Costs Analysis (CE/ICA) and trade-off analysis. With experience in Corps methodologies, use of the Hydrologic Engineering Center's Flood Damage Reduction Analysis (HEC-FDA) model and the Institute for Water Resources (IWR) Planning Suite is preferred.
Environmental Law Compliance/Biological/Cultural Resources Reviewer	The Panel Member should be a scientist or environmental planner from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm. The Panel Member must have at least 15 years experience directly related to water resource environmental evaluation or review and National Environmental Policy Act (NEPA) compliance, with a minimum MS degree or higher in a related field. The Panel Member should be familiar with the habitat, fish and wildlife species, and tribal cultures and archeology that may be affected by the project alternatives in this study area. The candidate

	<p>should be experienced with National Historic Preservation Act (NHPA) consultation specifically related to the archeology and history of Pacific Islands. Additionally, the Panel Member should be an expert in compliance with additional environmental laws, policies, and regulations, including compliance in Fish and Wildlife Coordination Act, Clean Water Act and Endangered Species Act. The candidate should be familiar with United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980).</p>
<p>Hydrology and Hydraulic Engineering</p>	<p>The panel member must be a registered professional engineer with a minimum of 15 years experience in hydrologic and hydraulic engineering as it relates to flood risk management in flash-flood urbanized watersheds (preferably with familiarity of tropical and mountain systems). The reviewer should be familiar with application of detention/retention basins, application of flood walls, non-structural solutions involving flood warning systems and flood proofing, etc and/or computer modeling such as Hydraulic Engineering Center (HEC) River Analysis System (RAS). The candidate should be familiar with Executive Order (EO) 11988 Floodplain Management (May 1977).</p>
<p>Structural/Civil Engineering</p>	<p>Panel Member should be from academia, a public agency whose mission includes flood risk management, a non-governmental entity, or an Architect-Engineer or Consulting Firm. The panel member must be a registered professional engineer having a minimum of 15 years experience in engineering. Panel Member should have extensive experience in earthen berm designs for flow through flood water detention basins, reinforced concrete design /construction/evaluation of flood risk management structures (i.e., Concrete channels, floodwalls, levee embankments, etc.), including pump stations to maintain internal drainage. The panel member should have familiarity and experience in working with geotechnical evaluations and geo-civil design for flood risk management projects. Additionally, the panel member should be capable of addressing the USACE Safety Assurance Review (SAR)* aspects of all projects.</p>

7. MODEL CERTIFICATION AND APPROVAL

- **Planning Models.** The following planning models are anticipated to be used in the development of the decision document

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
Hawaii Stream Habitat Evaluation Procedure (HSHEP)	A site specific model developed for this study. In the absence of any regionalized ecosystem output model that quantifies habitat benefits for stream habitats in Hawaii, a customized spreadsheet model was developed specifically for use on the Ala Wai Canal study. The spreadsheet model was tailored to focus on metrics that are directly applicable to the project ecosystem and mitigation objectives. In particular, habitat quality parameters contained within the model serve as a key dataset for quantification of habitat impacts and benefits in the spreadsheet model. In addition, elements of the HEP approach were used, as the State of Hawaii Division of Aquatic Resources has conducted a state wide stream and watershed assessment using this approach, providing focused baseline information on stream functions throughout the State, including the streams within the Ala Wai sub-watersheds.	Approved 28 MAY 2015 for single use
IWR-Planning Suite	USACE cost-effectiveness and incremental cost analysis software; utilized in the formulation, evaluation and comparison of alternative plans for environmental mitigation.	Certified
HEC-FDA 1.2.5 (Flood Damage Analysis)*	<p>The Hydrologic Engineering Center Flood Damage Reduction Analysis (HEC-FDA) program provides the capability for integrated hydrologic engineering and economic analysis for formulating and evaluating FRM plans using risk-based analysis methods. The program will be used to evaluate and compare the future without- and with-project plans within the Ala Wai Watershed to aid in the selection of a recommended plan to manage flood risk.</p> <p>* The USACE Senior Leader Panel conferred with the Tentatively Selected Plan effective May 1, 2015. The Draft Report is based on HEC FDA 1.2.5. HEC-FDA will be updated following the concurrent ATR, IEPR, and Public Review.</p>	Certified

- **Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study
HEC-RAS 4.0 (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 within the Ala Wai basin.

8. REVIEW SCHEDULES AND COSTS

- **Previously Completed Reviews.** The following is a list of previously completed reviews of the study:
 - (1) Feasibility Scoping Meeting DQC – 06/21/10*
 - (2) Feasibility Scoping Meeting ATR – 11/30/10*
 - (3) Draft Feasibility Study Report DQC – 09/30/15*Completed prior to re-scoping charette
- **ATR Schedule and Cost.** ATR schedule will be as follows, beginning from the receipt of all necessary documents:
 - (1) Draft Decision Document Review Begins – 11/23/2015
 - (2) ATR Conference Call – 12/01/2015
 - (3) ATR Review/Comments Complete – 12/11/2015
 - (4) PDT Review Complete – 12/18/2015
 - (5) ATR Backcheck Complete – 01/06/2016
 - (6) ATR Comment Resolution (if necessary) – 01/12/2016
 - (7) Receipt of draft decision document ATR Report – 01/15/2016
 - (8) Final Decision Document Review Begins – 07/01/2016
 - (9) ATR Review/Comments Complete – 07/11/2016
 - (10) PDT Review Complete – 07/20/2016
 - (11) ATR Backcheck Complete – 07/26/2016
 - (12) ATR Closeout Complete – 08/01/2016
 - ATR Costs are estimated to be \$48,256 for the draft ATR; \$10,000 for review of the final document
- **Type I IEPR Schedule and Cost.** The IEPR schedule will be as follows, beginning from the receipt of all necessary documents:
 - (1) Notice to Proceed – 09/20/2015
 - (2) OEO kickoff meeting with USACE – 09/24/2015
 - (3) OEO completes subcontracts to panel members – 10/15/2015
 - (4) IEPR panel member review initiation – 10/19/2015
 - (5) OEO convenes mid-review teleconference with panel members and USACE – 10/26/2015
 - (6) USACE provides public comments to panel – 11/17/2015
 - (7) IEPR panel completes final comments – 11/30/2015
 - (8) OEO submits IEPR Report to USACE – 12/09/2015
 - (9) USACE provides draft evaluator responses for PCX review – 01/06/2015
 - (10) OEO provides backcheck responses – 02/17/2015
 - IEPR Contract Costs are estimated to be \$90,410
 - IEPR PCX Management is estimated to be \$13,390
 - IEPR PCX Subject Matter Expert Support is estimated to be \$2000
 - IEPR IWR Management is estimated to be \$2766
 - Total IEPR Costs are estimated to be \$108,566
- **Model Certification/Approval Schedule and Cost.** Not Applicable.

9. PUBLIC PARTICIPATION

Significant public outreach has been conducted by the non-federal sponsor which has contributed greatly to the development of the Feasibility Study Report. Additional public outreach is currently being conducted through the NEPA public review process. Review of the report will be actively coordinated with State and Federal agencies. Submitted comments will be considered in the final draft of the report.

10. REVIEW PLAN APPROVAL AND UPDATES

The Pacific Ocean Division (POD) 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. 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 3. 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.

11. REVIEW PLAN POINTS OF CONTACT

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

- Michael Wyatt, Planner/Project Manager, Honolulu District (POH); 808.835.4031
- Russell Iwamura, District Support Team (POD); 808.835.4625
- Eric Thaut, Flood Risk Management Planning Center of Expertise (SPK); 415.503.6852

ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the [draft Feasibility Study Report](#) for [the Ala Wai Canal Flood Risk Management Study, Oahu, Hawaii](#). 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.

SIGNATURE

Name
ATR Team Leader
Office Symbol/Company

Date

SIGNATURE

Name
Project Manager
Office Symbol

Date

SIGNATURE

Name
Architect Engineer Project Manager¹
Company, location

Date

SIGNATURE

Name
Review Management Office Representative
Office Symbol

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.

SIGNATURE

Name
Chief, Engineering Division
Office Symbol

Date

SIGNATURE

Name
Chief, Planning Division
Office Symbol

Date

¹ Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number
22-MAR-2010	Initial approval date	
28-DEC-2012	Revised to accommodate changes in scope	Throughout
27-OCT-2015	Revised to accommodate changes in scope, team members, review members	Throughout
21-DEC-2015	Revised to accommodate changes requested by FRM-PCX	Throughout
13-JAN-2016	Revised to accommodate changes requested by FRM-PCX	Throughout

ATTACHMENT 4: 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
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
FRM	Flood Risk Management	QA	Quality Assurance
FSM	Feasibility Scoping Meeting	QC	Quality Control
GRR	General Reevaluation Report	RED	Regional Economic Development
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RMC	Risk Management Center
IEPR	Independent External Peer Review	RMO	Review Management Organization
ITR	Independent Technical Review	RTS	Regional Technical Specialist
LRR	Limited Reevaluation Report	SAR	Safety Assurance Review
MSC	Major Subordinate Command	USACE	U.S. Army Corps of Engineers
		WRDA	Water Resources Development Act

ATTACHMENT 5: DISTRICT QUALITY CONTROL (DQC) SUMMARY
To be completed